MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

VOL. XXV. JANUARY, 1897. No. 1

INTRODUCTION.

The REVIEW for January, 1897, is based on 2,748 reports from stations occupied by regular and voluntary observers, classified as follows: 137 from Weather Bureau stations; numerous special river stations; 33 from post surgeons, received through the Surgeon General, U. S. Army; 2,435 from voluntary observers; 96 received through the Southern Pacific Railway Company; 14 from Life-Saving stations, received through the Superintendent United States Life-Saving Service; 33 from Canadian stations; 1 from Hawaii; 30 from Mexican stations. International simultaneous observations are received from a few stations and used together with trustworthy newspaper extracts and special reports.

The WEATHER REVIEW is prepared under the general editorial supervision of Prof. Cleveland Abbe. Unless otherwise specifically noted, the text is written by the Editor, but the meteorological tables contained in the last section are furnished by Mr. A. J. Henry, Chief of the Division of Records and Meteorological Data. Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada, Mr. Curtis J. Lyons, Meteorologist to the Government Survey, Honolulu, and Dr. Mariano Bárcena, Director of the Central Meteorological Observatory of Mexico.

CLIMATOLOGY OF THE MONTH.

GENERAL CHARACTERISTICS.

Several severe general storms occurred during the month, the notable ones were that which passed from the Lake Region on the 22d to the Gulf of St. Lawrence on the 26th, and that which passed from Florida on the 26th to New England on the 28th. Although pressures reduced to sea level were very high in the western Canadian Provinces and the Missouri Valley, yet only cold waves but no remarkable blizzards occurred in the Mississippi Valley. Generous snowfall covered the northern portion of the country and the winter wheat is, therefore, in very good condition. An unusual amount of rainfall occurred in southern California where the crops have been correspondingly benefited. Temperature, with severe cold waves, was below normal on the Gulf and south Atlantic coasts, but the cold did considerably less damage to vegetation than was anticipated. Precipitation was deficient in northern California, Washington, and Oregon, but the weather was otherwise favorable for agricultural operations.

ATMOSPHERIC PRESSURE.

[In inches and hundredths.]

The distribution of mean atmospheric pressure reduced to sea level, as shown by mercurial barometers, not reduced to standard gravity, and as determined from observations taken daily at 8 a. m. and 8 p. m. (seventy-fifth meridian time), is shown by isobars on Chart IV. That portion of the reduction to standard gravity that depends on latitude is shown by the numbers printed on the right-hand border.

The *mean pressures* during the current month were high throughout the ridge extending from the Rocky Mountain plateau region southeast to the Gulf States. They were low over Newfoundland and the Gulf of California. The highest reduced pressures were: In the United States, Lander, 30.35; Idaho Falls, 34.34; Helena, 30.31; in Canada, Battleford, 30.25; Edmonton and Swift Current, 30.22. The lowest were: In the United States, Eastport and Portland, Me., 30.00; Sault Ste. Marie, Marquette, and Fort Canby, 30.02; Tatoosh Island and Phœnix, 30.03; in Canada, St. Johns, 29.84; Sydney, Charlottetown, and Father Point, 29.94.

As compared with the normal for January, the mean pressure was in excess over the Plateau region, southern Slope, Gulf and South Atlantic States. It was deficient in California, Oregon, the northern portion of the Lake Region and the St. Lawrence Valley. The greatest excesses were: In the United States, Helena, 0.19; Lander 0.13; Spokane, 0.11; Idaho Falls and Cheyenne, 0.10; in Canada, Edmonton, 0.09; Swift Current and Qu'Appelle, 0.04; Medicine Hat, 0.03. The greatest deficits were: United States, Roseburg, 0.06; San Diego and Portland, Me., 0.05; Fresno and Marquette, 0.03; Canada, Port Arthur and Farther Point, 0.06; Port Stanley and Quebec, 0.04; Montreal and Calgary, 0.03.

As compared with the preceding month of December, the pressures reduced to sea level show a rise over the northern Plateau and the northern and middle Slope regions, but a fall over the Lake Region, the Atlantic States, California, and the Southern Plateau. The greatest rises were: United States, Havre, 0.22; Helena, 0.18; Medicine Hat, 0.17; Canada, Edmonton, 0.27; Medicine Hat, 0.25; Battleford and Calgary, 0.24. The greatest falls were: United States, Northfield, 0.18; Oswego, 0.11; Sault Ste. Marie, 0.10; Canada, Port Stanley, 0.14; Kingston, 0.12; Montreal, 0.11.

AREAS OF HIGH AND LOW PRESSURE.

By Prof. H. A. HAZEN.

During January, 1897, six high areas and nine lows have been sufficiently well defined to be traced on Charts I and II. The position of the center of high or low for 8 a. m. and 8 p. m. of

each day is given and also the barometer reading near the center. It should be noted that this barometer reading does not indicate always the highest and lowest pressure at the center, but the one which is observed at the station nearest the center. The accompanying table gives the principal facts as to the place of origin and disappearance, the duration and velocity of these highs and lows, and a few general remarks are added.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	1, a. m.	53	111	3, a. m.	44	110	740	2.0	372	15.5
II	11, a. m.	51	106	14, a. m.	47	72	1,870	3.0	624	26.0
III	13, a. m.	53	105	15, p. m.	47	65	1,830	2.5	732	30.5
IV	16, p. m.	48	121	19, a. m.	36	85	2,290	2.5	917	38.2
V	18, a. m.	50	98	21, a. m.	47	57	2,100	3.0	700	29.2
VI	27, p. m.	42	106	31, p. m.	40	73	2,340	4.0	585	24.4
Total							11,170	17.0	3,930	
Mean of 6 tracks							1,862	2.8	655	27.3
Mean of 17.0 days									657	27.4
Low areas.										
I	1, a. m.	31	101	6, p. m.	49	60	2,760	5.5	502	20.9
II	7, a. m.	53	118	13, a. m.	47	54	3,890	6.0	648	27.0
III	11, p. m.	52	115	14, a. m.	38	85	1,990	2.5	797	33.2
IV	14, a. m.	52	113	16, a. m.	50	79	1,490	2.0	744	31.0
V	15, p. m.	52	116	19, a. m.	49	53	3,400	3.5	792	40.5
VI	17, p. m.	51	111	20, a. m.	50	85	1,300	2.5	521	21.7
VII	19, a. m.	26	98	22, a. m.	47	63	2,480	3.0	828	34.5
VIII	19, p. m.	48	128	26, a. m.	49	66	4,540	6.5	697	29.0
IX	26, a. m.	26	85	30, a. m.	46	54	2,330	4.0	582	24.2
Total							24,180	35.5	6,291	
Mean of 9 tracks							2,687	3.9	699	29.1
Mean of 35.5 days									681	28.4

HIGHS.

These have had but little motion, the high pressures of the month being mostly stagnant phenomena in the middle Plateau Region.

The month opened with a high to the north of Montana. On the same day in the p. m. this high began spreading south and southwest. On the morning of the 2d this high had spread over the territory from the limits of observation at the north to Nevada and Colorado on the south, and from the Pacific Coast to the eastern Rocky Mountain Slope. For the next three days this condition remained nearly unchanged. On the 4th, a. m., this high concentrated in the middle Plateau Region, with a slight tendency to a flow of air or to a spread of the high pressure toward the south and southeast, reaching even to the Gulf of Mexico. On the 6th the high pressure tendency had spread to the southeast, reaching the Atlantic Coast p. m. of this day. On the 8th, a. m., there was a well-defined ridge of high pressure extending from the north Pacific Coast to the west Gulf, and thence to the south Atlantic Coast where it turned northeast and finally passed off beyond the region of observation north of the Gulf of St. Lawrence. This ridge of high pressure was broken through in its northern extension by low area No. II, 9th, p. m., but the remainder of the ridge could be easily located till the 11th, p. m. The tendency of this ridge was to diminish the intensity of storm conditions which were prevailing in the northern part of the country east of the Mississippi.

IV.—On p. m. of the 16th a high appeared in Washington and moved to the middle Plateau Region. A portion of this high remained in the middle Plateau Region until the 23d, a. m., and another portion behaved almost exactly like No. I, already described.

On p. m. of the 21st another high pressure area appeared to the north of Montana and remained there, gradually increasing in magnitude. On a. m. of the 24th a reduced pressure of 31.52 was reported from Medicine Hat, which is the highest ever reported from there. There was a tendency to a gradual extension of the high pressure toward the southeast, but no movement could be detected till the 27th, p. m., when high No. VI developed in southeast Colorado. On the 29th, a. m., this high pressure area seems to have concentrated in the lower Mississippi Valley. From that region there was a slight forward movement, the high reaching the middle Atlantic coast on the last day of the month.

During the month all the high area conditions may be denominated as almost entirely passive, only slightly modifying storm conditions which developed to the north of Montana and had a prominent locus or common point of attraction in the Gulf of St. Lawrence.

LOWS.

Six of the lows of the month were last noted in the Gulf of St. Lawrence or near there. The month opened with a trough of low pressure extending from Texas to Minnesota. This condition was well formed till p. m. of the 3d, when the high pressure in the Plateau Region filled in behind as the storm moved to the eastward. A wind velocity of 48 miles per hour was noted in this storm at St. Louis and Chicago on the 4th, p. m.

The most interesting storm of the month was No. VIII, which originated off the north Pacific Coast p. m. of the 19th. On this date a ridge of high pressure extended from the middle Plateau to the north of Montana, through which this storm passed. The pressure at Qu'Appelle a. m. of the 21st was 29.24. On the 22d, p. m., the storm had reached the lower Lake Region causing a wind of 52 miles per hour at Cleveland. During the next twelve hours a wind of 56 miles was noted at Buffalo. On the 23d, p. m., this storm reached the Gulf of St. Lawrence where it remained nearly stationary for forty-eight hours. On the 25th a. m. the pressure was 29.06 at St. Johns, Newfoundland, and the storm was between that point and Nova Scotia. It then moved west, causing the lowest pressure of the month, 28.86, at Father Point on the 26th, a. m. This is taken as the last point of the storm, though it is probable that it moved very rapidly across the Gulf of St. Lawrence eastward in the next twelve hours.

IX.—This storm was first noted to the west of southern Florida on the 26th a. m., with a pressure of 29.96. In forty-eight hours it had moved off Long Island Sound, increasing markedly in intensity, a pressure of 29.10, and a wind of 48 miles being reported from Block Island on the 28th, a. m. At 1 p. m. of the 28th the pressure reached 28.98 at Boston, and a wind of 56 miles was reported at Eastport. On the 28th, p. m., the wind had reached 68 miles per hour at Eastport, from the east. During the whole month the high areas presented stagnant, passive phenomena, while the lows were active and aggressive.

TEMPERATURE OF THE AIR.

[In degrees Fahrenheit.]

The mean temperature is given for each station in Table II, for voluntary observers. Both the mean temperatures and the departures from the normal are given in Table I for the regular stations of the Weather Bureau, which also gives the height of the thermometers above the ground at each station.

The *monthly mean temperatures* published in Table I, for the regular stations of the Weather Bureau, are the simple means of all the daily maxima and minima; for voluntary stations a variety of methods of computation is necessarily allowed, as shown by the notes appended to Table II.

The *regular diurnal period* in temperature is shown by the hourly means given in Table V for 29 stations selected

out of 82 that maintain continuous thermograph records.

The *distribution of the observed monthly mean* temperature of the air over the United States and Canada is shown by the dotted isotherms on Chart IV; the lines are drawn over the Rocky Mountain Plateau region, although the temperatures have not been reduced to sea level, and the isotherms, therefore, relate to the average surface of the country occupied by our observers; such isotherms are controlled largely by the local topography, and should be drawn and studied in connection with a contour map.

The *highest mean temperatures* were: In the United States, Key West, 67.6; Jupiter, 62.6; Tampa, 57.6; San Diego, 55.8; Yuma, 55.2; in Canada, Esquimault, 38.4; Yarmouth, 25.2; Kamloops, 26.4. The lowest were: In the United States, Moorhead, 2.0; Bismarck, 5.8; Duluth, 9.4; in Canada, Winnipeg, —3.0; Minnedosa, —2.4.

As compared with the normal for January the mean temperature for the current month was in excess throughout the Canadian Provinces and the northern portion of the United States. It was deficient in central California, the Middle and South Atlantic and Gulf States. The greatest excesses were: In the United States, Havre, 8.1; Spokane, 7.9; North Platte, 7.3; in Canada, Swift Current, 10.6; Minnedosa, 9.1; Qu'Appelle, 9.0. The largest deficits were: United States, Amarillo, 5.9; Columbia, S. C., and Jupiter, Fla., 4.4; Chattanooga, 4.1; Canada, none.

Considered by districts the mean temperatures of the current month show departures from the normal as given in Table I. The greatest positive departures were: North Dakota, 3.5; northern Slope, 3.9; middle Plateau, 3.0; northern Plateau, 4.2. The greatest negative departures were: South Atlantic, 3.3; Florida Peninsula, 2.9; southern Slope, 3.2.

The *years of highest and lowest mean temperatures* for January are shown in Table I of the REVIEW for January, 1894. The mean temperature for the current month was the highest on record only at Seattle: 39.1. The mean temperature was the lowest on record only at Amarillo, 27.6.

The *maximum and minimum temperatures* of the current month are given in Table I. The highest maxima were: 80, Jupiter (21st); 79, Key West (21st) and Los Angeles (22d); 78, Tampa and Palestine (1st); 76, Jacksonville (4th), Mobile (17th), Corpus Christi (2d), and San Antonio (1st). The lowest maxima were: 37, Moorhead (1st); 38, Williston (21st); 41, Huron and Idaho Falls (21st). The highest minima were: 51, Key West (29th); 40, San Francisco (11th) and San Diego (2d); 39, Yuma (16th) and Point Reyes Light (13th). The lowest minima were: —38, Havre (24th); —32, Williston (frequently); —30, Bismarck (24th); —29, Duluth (24th); —28, Moorhead (24th).

The *limits of minimum temperatures*, 32° and 40°, are shown by lines on Chart No. V.

The *years of highest maximum and lowest minimum temperatures* for January are given in the last four columns of Table I of the REVIEW for 1896. During the current month the maximum temperatures were equal to or exceeded the highest on record at: Dubuque and Davenport, 63; Miles City, 54: Green Bay, 51; St. Paul, 49; Sault Ste. Marie, 44. The minimum temperatures were equal to or exceeded the lowest on record at: Chicago, —20; Toledo, Detroit, and Pueblo, —16; Columbia, S. C., 10; Tampa, 29; Jupiter, 34.

The *greatest daily range of temperature and the data for computing the extreme and mean monthly ranges* are given for each of the regular Weather Bureau stations in Table I. The largest values of the greatest daily ranges were: Dodge City, 55; Helena, 54; Cheyenne, 51; Northfield, 50; Denver, 48; Pueblo, 47; Lander, 45. The smallest values were: Astoria, 14; Tatoosh Island and San Francisco, 15; Seattle and Key West, 16; Point Reyes Light and Pysht, 17; Port Angeles and Fort Canby, 18.

Among the *extreme monthly ranges* the largest were: Havre, 91; Dubuque, 86; Rapid City, 84; Miles City, Pueblo, Davenport, and Keokuk, 82; La Crosse, 80. The smallest values were: Tatoosh Island and San Francisco, 20; Point Reyes Light, 24; Sacramento, 26; Eureka and Key West, 28; Astoria, 29.

Accumulated monthly departures from normal temperatures for the period January 1 to 31, in regions where the temperature was deficient, the average deficit was as follows: Middle Atlantic, 1.8; south Atlantic, 3.3; Florida Peninsula, 2.9; east Gulf, 2.6; west Gulf, 0.3; Ohio Valley and Tennessee, 1.7; lower Lake, 0.8; southern Slope, 3.2.

In regions where the temperature was in excess, the average excess was as follows: New England, 0.5; upper Lake, 2.5; North Dakota, 3.5; upper Mississippi, 1.0; Missouri Valley, 2.1; northern Slope, 3.9; middle Slope, 2.6; southern Plateau, 0.3; middle Plateau, 3.0; northern Plateau, 4.2; north Pacific, 1.9; middle Pacific, 0.2; south Pacific, 1.3.

MOISTURE.

The *quantity of moisture* in the atmosphere at any time may be expressed by the weight of the vapor coexisting with the air contained in a cubic foot of space, or by the tension or pressure of the vapor, or by the temperature of the dew-point. The mean dew-point for each station of the Weather Bureau, as deduced from observations made at 8 a. m. and 8 p. m., daily, is given in Table I.

The *rate of evaporation* from a special surface of water on muslin at any moment determines the temperature of the wet-bulb thermometer. The mean wet-bulb temperature is now published in Table I; it is always intermediate, and generally about half way between the temperature of the air and of the dew-point. The quantity of water evaporated from the muslin surface may be considered as depending essentially upon the wet-bulb temperature, the dew-point, and the wind.

The *relative humidity*, or the ratio between the moisture that is present in the air and the moisture that it would contain if saturated at its observed temperature is given in Table I as deduced from the 8 a. m. and 8 p. m. observations. The general average for a whole day or any other interval would properly be obtained from the data given by an evaporometer, but may also be obtained, approximately, from frequent observations of the relative humidity.

PRECIPITATION.

[In inches and hundredths.]

The *distribution of precipitation* for the current month, as determined by reports from about 2,500 stations, is exhibited on Chart III. The numerical details are given in Tables I, II, and III. The total precipitation for the current month exceeded 10 inches over a narrow region on the coast of Washington and Oregon and over small regions in Arkansas and Louisiana. The larger values for regular stations were: Tatoosh Island, 12.20; Astoria, 9.84; Fort Canby, 9.58; Little Rock, 8.51; Grand Haven, 7.99; San Luis Obispo, 5.22; Jupiter, 5.20. Canada: St. Johns, N. F., 11.40.

Details as to *excessive precipitation* for January are given in Tables XI and XII.

The *years of greatest and least precipitation* for January are given in the REVIEW for January, 1890. The precipitation for the current month was the greatest on record at: Little Rock, 8.51; Grand Haven, 7.99; Columbia, Mo., 6.87; Springfield, Mo., 6.47; Springfield, Ill., 5.91; Keokuk, 4.90; Chicago, 4.53; Phœnix, 3.67; Huron, 2.87; Yuma, 2.83; Kansas City, 2.66; Amarillo, 2.26; Pierre and Minneapolis, 1.66; Moorhead, 1.56; Sioux City, 1.41. It was the least on record at: Idaho Falls, 0.67; Cape Henry, 0.92; Kitty Hawk, 1.35;

Tampa, 1.42; Columbus, Ohio, 1.54; Roseburg, 1.66; Port Angeles, 1.97; Eureka, 3.04.

The *diurnal variation*, as shown by tables of hourly means of the total precipitation, deduced from self-registering gauges kept at the regular stations of the Weather Bureau, is not now tabulated.

The *current departures* from the normal precipitation are given in Table I, which shows that precipitation was in excess in southern California, Arizona, New Mexico, northern Texas, the Missouri and Mississippi valleys, and Lake Region. It was deficient in northern California, Washington, Oregon, and the northern Plateau Region, and also in the east Gulf and Atlantic States. The larger excesses were: Grand Haven, 5.3; Columbia, Mo., 5.0; Hannibal, 4.9. The larger deficits were: Eureka, 5.4; Roseburg, 4.5; Portland, Oreg., Pensacola, and Hatteras, 3.9; Kittyhawk, 3.8.

The *average departure* for each district is given in Table I. By dividing each current precipitation by its respective normal the following corresponding percentages are obtained (precipitation is in excess when the percentage of the normal exceeds 100):

Above the normal: West Gulf, 131; upper Lake, 173; North Dakota, 138; upper Mississippi, 207; Missouri Valley, 259; middle Slope, 111; southern Slope (Abilene), 230; southern Plateau, 378; south Pacific, 138.

Normal: Lower Lake, 100.

Below the normal: New England, 90; middle Atlantic, 54; south Atlantic, 46; Florida Peninsula, 81; east Gulf, 65; Ohio Valley and Tennessee, 65; northern Slope, 72; middle Plateau, 65; northern Plateau, 54; north Pacific, 76; middle Pacific, 53.

The *total accumulated monthly departures* from normal precipitation since the beginning of the current year furnishes the following, in inches: *Excesses:* West Gulf, 1.10; upper Lake, 1.50; North Dakota, 0.30; upper Mississippi, 1.80; Missouri Valley, 1.70; middle Slope, 0.10; southern Slope, 1.00; southern Plateau, 1.50; southern Pacific, 0.80. *Normal:* Lower Lake, 0.00. *Deficits:* New England, 0.40; middle Atlantic, 1.70; south Atlantic, 2.30; Florida Peninsula, 0.80; east Gulf, 1.80; Ohio Valley and Tennessee, 1.50; northern Slope, 0.20; middle Plateau, 0.60; northern Plateau, 1.00; north Pacific, 2.10; middle Pacific, 2.60.

SNOWFALL.

The *total monthly snowfall* at each station is given in Tables I and II; its geographical distribution is shown on Chart V. This chart also shows the isotherms of minimum 32° and of minimum 40° for the air within the ordinary thermometer shelter. The former isotherm is an approximate limit to possible snow, while the latter is an approximate southern limit to the regions that report frost in exposed localities.

Snowfalls of from 10 to 45 inches are reported from the higher stations in the Sierra Nevada; from 15 to 78 inches at the higher stations of the Rocky Mountains; 15 to 33 in the eastern half of South Dakota; 5 to 43 in Michigan Lower Peninsula; and 5 to 49 in the Upper Peninsula; 9 to 32 on the south shore of Lake Erie, and 9 to 60 south shore of Lake Ontario. In general the snowfall has been abundant throughout the United States and Canada. St. Johns, N. F., reports 74 inches.

The *depth of snow on the ground* at the end of the month is given in detail in Table II, and for the winter months is also shown on Chart VI; it is also shown on the weekly charts of the Climate and Crop Service, published by the Weather Bureau during December to March, inclusive.

In general at the close of the month there was about 15 inches of snow on the ground in the interior of New England, New York; 10 to 30 inches in the eastern portion of North and South Dakota; 5 inches in Pennsylvania, northern Ohio, Indiana, and Illinois; 10 to 20 inches on the east shore of Lake Michigan; from 2 to 20 inches are reported over the Rocky Mountain Plateau Region and the Sierra Nevada. The maximum is 68 inches near Lake Tahoe.

ICE.

The *thickness of ice* in the rivers and harbors is shown in detail in the bulletins published every Monday by the Weather Bureau, and is also given in some detail in the chapter on "River and Flood Service." The more prominent characteristic data for the first Monday of January and the close of the month, viz, Monday, February 1, are as follows: Iowa, Sioux City, 8.0 and 19.0, respectively; Maine, Bangor, 14.0 and 16.5; Eastport, 11.0 and 18.0, Gardiner, 9.6 and 14.6, Lewiston, 11.0 and 20.0; Massachusetts, Concord, 7.0 and 14.0; Minnesota, Duluth, 19.0 and 24.0, Moorhead, 20.0 and 28.0, St. Paul, 11.0 and 23.0; Nebraska, Valentine, 16.0 and 21.0; North Dakota, Bismarck, 18.0 and 33.0; South Dakota, Pierre, 16.0 and 20.0, Yankton, 11.0 and 20.0; Vermont, Brattleboro, 4.5 and 12.5; Wisconsin, Green Bay, 1.0 and 10.5, La Crosse, 2.0 and 13.0.

At the close of the month the Mississippi and tributaries were frozen up as far south as Quincy on the Mississippi, Louisville on the Ohio, and Hermann on the Missouri, there is, therefore, more ice in the rivers than on the corresponding dates of 1896.

ICE AND SNOW IN CANADA.

Snow.—On the January Weather Map of the Canadian Service, the Director, Prof. R. F. Stupart, says:

In many portions of British Columbia there was no snow on the level ground at the end of the month, and from what can be gathered the amount of snow on the mountains is not as great as usual. In Alberta, Assiniboia, Saskatchewan, and Manitoba, the precipitation was a little above the average in some localities and a little below in others; in southern Alberta and southwestern Assiniboia the amount of snow on the ground at the end of the month is only from 1 to 3 inches, but elsewhere it is considerable, as Edmonton reports 16 inches, Prince Albert and Winnipeg, 18, and Minnedosa, 30. The snow on ground in Ontario and Quebec is generally not up to the average; special stations reported as follows: Owen Sound, 42; Southampton, 48; Father Point, 22; Anticosti, 34; Chatham, 17; Yarmouth, 19; Sydney, 18; and Charlottetown, 9 inches.

Ice.—The thickness of ice is reported as follows: Assiniboia: Regina and Medicine Hat, 30. Ontario, Port Arthur, 30; Parry Sound, 10; Port Stanley, 8; Kingston, 15; Midland, Bobcaygeon, and Gravenhurst, 14; Sarnia, 10; Barrie, 10; Owen Sound, 12; Sparrow Lake, 13; Wiarton, 8 inches. Maritime Provinces: St. Andrews, 20 inches; Shippigan, 22; Port Hastings, 16; Georgetown, 11.

SLEET.

The following are the dates on which sleet fell in the respective States:

Alabama, 26. Arkansas, 12, 13, 19, 20, 24, 25, 26, 31. California, 14, 15. Colorado, 12. Connecticut, 17. District of Columbia, 4, 17, 20, 21. Georgia, 13, 20, 24 to 27. Idaho, 24, 29. Illinois, 3, 13, 16, 20. Indiana, 4, 13 to 17, 19, 20. Indian Territory, 3, 19. Iowa, 2, 3, 4, 12, 13, 14, 16. Kentucky, 8, 13, 20, 21, 24, 27. Louisiana, 1, 3, 19, 25, 26, 27, 30, 31. Maine, 17, 18. Maryland, 5, 14, 15, 17, 20, 28 to 31. Massachusetts, 11, 17, 18 to 21. Michigan, 1, 2, 3, 9, 10, 16, 17, 20. Minnesota, 2, 3, 16. Mississippi, 19, 25, 26. Missouri, 1 to 4, 12, 13, 15, 16, 17, 20, 23, 24, 25, 27. Montana, 21, 22. Nebraska, 1, 2, 12, 13, 16, 20, 21. Nevada, 10, 13, 24, 25, 29. New Hampshire, 2, 17, 21, 25, 28. New Jersey, 13, 15, 17, 18, 20. New Mexico, 11, 18, 26, 28. New York, 4, 5, 10, 17, 18, 20, 21, 24. North Carolina, 13, 14, 20, 21, 27, 28. North Dakota, 1, 21. Ohio, 2, 4, 13, 14, 15, 17, 18, 20. Oklahoma, 2, 8. Oregon, 17, 24, 27, 28, 31. Pennsylvania, 17, 18, 20, 21, 24. South Carolina, 13, 26, 27, 28. South Dakota, 1, 12, 16, 21. Tennessee, 5, 12, 13, 14, 20, 24, 28. Texas, 2,

3, 14, 16, 18, 19, 20, 24 to 31. Utah, 13, 15. 25. Vermont, 5, 17, 21. Virginia, 13, 14, 17, 20, 27, 28. Washington, 4, 11, 24, 25, 28, 29. West Virginia, 13, 14, 15, 17, 20, 21. Wisconsin, 2, 3, 16, 17, 20.

HAIL.

The following are the dates on which hail fell in the respective States:

Arkansas, 2. California, 13, 14, 29, 30. Illinois, 17. Indiana, 17. Mississippi, 19. Missouri, 2. Texas, 30.

WIND.

The *prevailing winds* for January, 1897, viz, those that were recorded most frequently, are shown in Table I for the regular Weather Bureau stations.

HIGH WINDS.

Maximum wind velocities are given in Table I, which also gives the altitude of the Weather Bureau anemometers above the ground. Maxima of 50 miles or more per hour were reported during this month at regular stations of the Weather Bureau as follows (maximum velocities are averages for five minutes; extreme velocities are gusts of shorter duration, and are not given in this table):

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
		Miles				*Miles*	
Amarillo, Tex	2	54	n.	Havre, Mont.	21	50	ne.
Block Island, R. I	21	51	se.	Huron, S. Dak	3	50	nw.
Do	28	53	nw.	Do	4	51	nw.
Buffalo, N. Y	17	50	w.	Indianapolis, Ind	17	57	sw.
Do	18	56	w.	Nashville, Tenn	3	52	s.
Do	22	53	w.	New York, N. Y	18	60	nw.
Do	23	55	w	Do	23	52	nw.
Do	25	58	w.	Do	26	52	w.
Do	26	55	w.	Tatoosh Island, Wash.	24	58	e.
Chicago, Ill	4	51	w.	Do	25	60	e.
Do	17	62	w.	Toledo, Ohio	17	50	sw.
Cleveland, Ohio	22	51	w.	Williston, N. Dak	21	58	n.
Eastport, Me	28	66	e.	Woods Hole, Mass.	21	50	se.
Fort Canby, Wash	18	52	se.	Do	25	56	w.
Do	28	54	e.	Do	28	54	ne.

The *resultant winds*, as deduced from the personal observations made at 8 a. m. and 8 p. m., are given in Table VIII. These latter resultants are also shown graphically on Chart IV, where the small figure attached to each arrow shows the number of hours that this resultant prevailed, on the assumption that each of the morning and evening observations represents one hour's duration of a uniform wind of average velocity. These figures indicate the relative extent to which winds from different directions counterbalanced each other.

SUNSHINE AND CLOUDINESS.

The quantity of sunshine, and therefore of heat, received by the atmosphere as a whole is very nearly constant from year to year, but the proportion received by the surface of the earth depends upon the absorption by the atmosphere, and varies largely with the distribution of cloudiness. The sunshine is now recorded automatically at 22 regular stations of the Weather Bureau by its photographic, and at 35 by its thermal effects. At one of these stations records are kept by both methods. The photographic record sheets show the apparent solar time, but the thermometric records show seventy-fifth meridian time; for convenience the results are all given in Table X for each hour of local mean time. In order to complete the record of the duration of cloudiness these registers are supplemented by special personal observations of the state of the sky near the sun in the hours after sunrise and before sunset, and the cloudiness for these hours has been added as a correction to the instrumental records, whence results a complete record of the duration of sunshine from sunrise to sunset.

The average cloudiness of the whole sky is determined by numerous personal observations at all stations during the daytime, and is given in the column "average cloudiness" in Table I; its complement, or percentage of clear sky, is given in the last column of Table X.

Difference between instrumental and personal observations of sunshine.

Stations.	Apparatus.	Total possible duration for the whole month.	Personal estimated area of clear sky.	Instrumental record of sunshine.			
				Photographic.	Difference.	Thermometric.	Difference.
		Hrs.	%	%	%	%	%
Tampa, Fla	T.	328.7	52	.....	.....	55	+ 3
Galveston, Tex	P.	326.8	39	36	− 3	.....	.....
New Orleans, La	T.	324.9	30	.....	.....	32	+ 2
Savannah, Ga	P.	320.5	48	43	− 5	.....	.....
Vicksburg, Miss	T.	320.5	55	.....	.....	56	+ 1
Charleston, S. C	T.	318.5	51	.....	.....	54	+ 3
Phœnix, Ariz	P.	318.5	57	63	+ 6	.....	.....
San Diego, Cal	P.	318.5	58	67	+ 9	.....	.....
Atlanta, Ga	T.	316.2	43	.....	.....	44	+ 1
Los Angeles, Cal	P.	316.2	58	66	+ 8	.....	.....
Wilmington, N. C	T.	316.2	56	.....	.....	60	+ 4
Chattanooga, Tenn	T.	314.6	41	.....	.....	42	+ 1
Little Rock, Ark	T.	314.6	41	.....	.....	53	+12
Nashville, Tenn	P.	311.8	49	.....	.....	55	+ 6
Raleigh, N. C	T.	311.8	47	.....	.....	55	+ 8
Santa Fe, N. Mex	P.	311.8	56	65	+ 9	.....	.....
Fresno, Cal	T.	309.0	22	.....	.....	19	− 3
Dodge City, Kans	P.	306.5	61	68	+ 7	.....	.....
Louisville, Ky	T.	306.5	37	.....	.....	45	+ 8
San Francisco, Cal	T.	306.5	40	.....	.....	53	+13
Atlantic City, N. J	P.	303.8	48	54	+ 6	.....	.....
Baltimore, Md	T.	303.8	45	.....	.....	38	− 7
Cincinnati, Ohio	T.	303.8	37	.....	.....	38	+ 1
Kansas City, Mo	P.	303.8	49	53	+ 4	.....	.....
St. Louis, Mo	T.	303.8	43	.....	.....	56	+13
Washington, D. C	P.	303.8	50	54	+ 4	.....	.....
Columbus, Ohio	T.	.....	.....	.....	.....	.....	.....
Denver, Colo	P.	301.1	54	65	+11	.....	.....
Indianapolis, Ind	T.	301.1	37	.....	.....	56	+19
Philadelphia, Pa	T.	301.1	44	.....	.....	54	+10
Cheyenne, Wyo	P.	298.4	46	62	+16	.....	.....
Eureka, Cal	P.	298.4	34	33	− 1	.....	.....
New York, N. Y	T.	298.4	45	.....	.....	54	+ 9
Omaha, Nebr	P.	289.4	48	52	+ 4	.....	.....
Pittsburg, Pa	T.	298.4	26	.....	.....	20	− 6
Salt Lake City, Utah	P.	298.4	25	44	+19	.....	.....
Binghamton, N. Y	T.	295.5	25	.....	.....	26	+ 1
Boston, Mass	T.	295.5	39	.....	.....	46	+ 7
Chicago, Ill	T.	295.5	37	.....	.....	38	+ 1
Cleveland, Ohio	T.	295.5	18	.....	.....	19	+ 1
Des Moines, Iowa	T.	295.5	53	.....	.....	54	+ 1
Detroit, Mich	T.	295.5	27	.....	.....	34	+ 7
Dubuque, Iowa	T.	295.5	39	.....	.....	35	− 4
Albany, N. Y.*	T.	292.7	30	.....	.....	37	+ 7
Buffalo, N. Y	T.	292.7	21	.....	.....	23	+ 2
Rochester, N. Y	T.	292.7	24	.....	.....	30	+ 6
Northfield, Vt	P.	289.7	33	39	+ 6	.....	.....
Portland, Me	T.	289.7	49	.....	.....	56	+ 7
Eastport, Me	P.	286.7	35	50	+15	.....	.....
Minneapolis, Minn†	T.	286.7	.....	.....	.....	39	.....
St. Paul, Minn	P.	286.7	38	38	0	.....	.....
Portland, Oreg	T.	283.1	29	.....	.....	24	− 5
	P.	283.1	29	22	− 7	.....	.....
Bismarck, N. Dak	P.	279.9	35	42	+ 7	.....	.....
Helena, Mont	P.	279.9	41	41	0	.....	.....
Seattle, Wash	T.	276.2	25	.....	.....	20	− 5
Spokane, Wash	P.	276.2	20	9	−11	.....	.....

* Instrumental record is for 23 days, for which the total possible is 214.5.
† No personal record is kept at Minneapolis.

COMPARISON OF DURATIONS AND AREAS.

The sunshine registers give the *durations* of effective sunshine whence the duration relative to possible sunshine is derived; the observers' personal estimates give the percentage of *area* of clear sky. These numbers have no necessary relation to each other, since stationary banks of clouds may obscure the sun without covering the sky, but when all clouds have a steady motion past the sun and are uniformly scattered over the sky, the percentages of duration and of area agree closely. For the sake of comparison, these percentages have been brought together, side by side, in the following table, from which it appears that, in general, the instrumental records of percentages of durations of sunshine are almost always larger than the observers' personal estimates of percentages of area of clear sky; the average excess for January, 1897, is 5 per

cent for photographic and 4 per cent for thermometric records.

The details are shown in the preceding table, in which the stations are arranged according to the *total possible* duration of sunshine, and not according to the *observed* duration as in previous years.

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IX, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—The dates on which reports of thunderstorms for the whole country were most numerous were: 1st, 40; 2d, 64; 16th, 73.

Thunderstorm reports were most numerous in: Louisiana, 27; Missouri, 42; Ohio, 50.

Thunderstorms were most frequent in: Louisiana, 9 days; Arizona and Ohio, 7; Missouri and Texas, 6.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, from the 14th to the 22d, inclusive. On the remaining twenty-two days of this month 104 reports were received, or an average of about 5 per day. The dates on which the number of reports especially exceeded this average were: 1st, 15; 2d, 52.

Auroras were reported most frequently in: Montana and South Dakota, 7 days; North Dakota, 6.

The number of reports was a large percentage of the number of observers in: Vermont, 62; Maine, 56; South Dakota, 37; Montana, 30; North Dakota, 25.

CANADIAN REPORTS.

A thunderstorm was reported at Montreal on the 21st.

Auroras were reported as follows: Halifax, 14th; Father Point, 30th; Quebec, 1st; Banff, 1st, 2d; Minnedosa, 2d, 3d, 5th, 28th, 30th; Qu'Appelle, 2d; Swift Current, 2d, 19th; Calgary, 1st, 3d, 26th, 27th; Prince Albert, 1st; Battleford, 2d, 3d, 4th; Kamloops, 2d.

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Snowfall and rainfall are expressed in inches.

Alabama.—The mean temperature was 42.2°, or 0.7° below normal; the highest was 83°, at Healing Springs on the 12th, and the lowest, 7° below zero, at Valleyhead on the 28th. The average precipitation was 3.60, or 1.76 below normal; the greatest monthly amount, 5.74, occurred at Greensboro, and the least, 1.23, at Pineapple.—*F. P. Chaffee.*

Arizona.—The mean temperature was 46.3°, or 6.3° above normal; the highest was 80°, at Maricopa, and the lowest, 5°, at Fort Apache on the 7th. The average precipitation was 3.16, or 2.16 above normal; the greatest monthly amount, 8.30, occurred at Pinal Ranch, and the least, 0.23, at San Simon.—*W. T. Blythe.*

Arkansas.—The mean temperature was 38.9°, or 0.7° below normal; the highest was 76°, at Texarkana on the 1st, and the lowest, 2° below zero, at Silver Springs on the 27th. The average precipitation was 6.53, or 2.47 above normal; the greatest monthly amount, 13.83, occurred at Pinebluff, and the least, 3.57, at Picayune.—*F. H. Clarke.*

California.—The mean temperature was 45.5°, or 0.1° below normal; the highest was 82°, at Coronado and Nordhoff on the 22d, and the lowest, 14° below zero, at Bodie on the 18th. The average precipitation was 2.69, or 1.83 below normal; the greatest monthly amount, 9.10, occurred at Mutah Flat, Ventura County, and the least 0.32, at Bishop, Inyo County. The unusual feature of the month was the greater rainfall in southern California as compared with the central and northern portions, the greatest rainfall occurring south of the Tehachapi range of mountains, while the least amount was in central and eastern California. This reverses the usual precipitation for the month of January. The excess of rainfall will be very beneficial to southern California, as the seasons have been drier than usual for several years past.—*J. A. Barwick.*

Colorado.—The mean temperature was 21.8°, or 3.0° above normal; the highest was 67°, at Cripple Creek on the 10th and 11th, and at Minneapolis on the 23d, and the lowest, 32° below zero, at Lay on the 27th. The average precipitation was 0.82, or 0.8 below normal; the greatest monthly amount, 8.60, occurred at Ruby, and the least, 0.06, at Lamar.—*F. H. Brandenburg.*

Florida.—The mean temperature was 56.2°, or 3.8° below normal; the highest was 86°, at Kissimmee on the 4th, and the lowest, 17°, at Pensacola on the 28th. The average precipitation was 1.90; the greatest monthly amount, 5.20, occurred at Jupiter, and the least, 0.18, at Kissimmee.—*A. J. Mitchell.*

Georgia.—The mean temperature was 42.6°, or 2.8° below normal; the highest was 77°, at Morgan on the 2d, Quitman on the 1st and 3d, and Brag on the 3d; the lowest was 6° below zero, at Tallapoosa on the 27th. The average precipitation was 2.66, or 2.44 below normal; the greatest monthly amount, 5.89, occurred at Diamond, and the least, 0.59, at Poulan.

Idaho.—The mean temperature was 23.1°; the highest was 58°, at Pollock on the 22d, and the lowest, 30° below zero, at Lake and Warren on the 26th. The average precipitation was 0.78; the greatest monthly amount, 2.82, occurred at Fort Sherman, while none fell at Martin.—*D. P. McCallum.*

Illinois.—The mean temperature was 24.1°, or 0.5° above normal; the highest was 70°, at Mt. Vernon on the 1st, and the lowest, 28° below zero, at Oregon on the 25th. The average precipitation was 4.59, or 2.30 above normal; the greatest monthly amount, 10.38, occurred at La Harpe, and the least, 1.96, at Scales Mound.—*C. E. Linney.*

Indiana.—The mean temperature was 25.3°, or 0.8°, below normal; the highest was 68°, at Vevay on the 1st and 3d, and lowest, 22° below zero, at Lafayette on the 25th. The average precipitation was 3.39, or 0.48 above normal; the greatest monthly amount, 5.97, occurred at Valparaiso, and the least, 1.73, at Greensburg. The weather during the month was not very favorable for wheat and clover, but there is no doubt that a good covering of snow during the greater part of the month protected these crops from greater injury during the exceedingly cold nights in the latter part of the month.—*C. F. R. Wappenhans.*

Iowa.—The mean temperature was 17.2°; the highest was 66°, at Keokuk and Madrid on the 1st, and the lowest, 30° below zero, at Rock Rapids on the 25th and at Elkador on the 26th. The average precipitation was 2.01; the greatest monthly amount, 6.16, occurred at Fort Madison, and the least, 0.15, at Portsmouth.—*G. M. Chappel.*

Kansas.—The mean temperature was 28.4°, or 0.4° above normal; the highest was 68°, at Columbus and Ottawa on the 1st, and the lowest, 16° below zero, at Goodland on the 27th. The average precipitation was 1.10, or 0.36 above normal; the greatest monthly amount, 5.46, occurred at Columbus, and the least, "trace," at Goodland and Grainfield.—*T. B. Jennings.*

Kentucky.—The mean temperature was 32.0°; the highest was 75°, at Ashland on the 3d, and the lowest, 16° below zero, at Louisa on the 30th. The average precipitation was 3.25, or 0.73 below normal; the greatest monthly amount, 4.96, occurred at Pilot Oak, and the least, 2.10, at Louisa. The general effects of the low temperature that prevailed the last week have not yet been ascertained definitely, but it is not likely they will be of a serious nature. The cold wave set in on the night of the 24th, and a general fall of snow occurred on the 27th, which was the central date of the cold period. This snow aided materially in heating the soil at about the time when it had become thoroughly frozen. It is probable that winter grain withstood the cold spell without much injury to the crop. Winter pastures had been excellent up to the period of cold weather.—*Frank Burke.*

Louisiana.—The mean temperature was 47.5°, or 3.1° below normal; the highest was 80°, at Melville on the 3d, and the lowest, zero, at Farmerville on the 26th. The average precipitation was 5.50, or 0.94 above normal; the greatest monthly amount, 12.20, occurred at Oberlin, and the least, 1.88, at Lawrence. It is evident that the severe cold of the latter part of January did considerably less damage than was expected, even to the orange trees and tender vegetation, and none

worthy of mention to the cane crop, either plant, seed, or stubble. December and the greater portion of January were rather dry, and plowing and some planting had progressed very favorably until the last week of January, when the cold weather and rain, sleet, and snow put a stop to all farm work.—*R. E. Kerkam.*

Maryland.—The mean temperature was 29.5°, or 2.5° below normal; the highest was 66°, at Jewell on t 4th, and the lowest, 12° below zero, at Deer Park on the 13th. Th erage precipitation was 1.95, or 1.33 below normal; the greatest monthly amount, 3.97, occurred at Grantsville, and the least, 0.81, at Milford, Del. Precipitation was fairly well distributed, although the greater portion fell during the second decade of the month; the deficient amount received during this and the preceding month has, however, caused a shortage in the water supply of some sections of the State. No snowfall of consequence occurred prior to the 13th, but since that date the amount of snowfall has sufficed to give total monthly depths ranging from 4 inches in the eastern sections to 20 and 28 inches in the mountain districts of western Maryland. Temperatures were above normal generally until the 24th, but the cold-wave period that set in at that time and lasted till the close of the month caused such marked temperature departures as to give a monthly mean of less than normal. Fortunately grain fields were protected from damage during the extreme cold of this period by an ample covering of snow.—*G. E. Hunt.*

Michigan.—The mean temperature was 20.7°, or 0.6° below normal; the highest was 59°, at several stations on the 2d, 3d, and 4th, and the lowest, 42° below zero, at Humboldt on the 19th. The average precipitation was 3.98, or 1.73 above normal; the greatest monthly amount, 9.05, occurred at Hart, and the least, 1.15, at Humboldt.—*C. F. Schneider.*

Minnesota.—The mean temperature was 72°, or about normal; the highest was 59°, at Winona on the 1st, and the lowest, 49° below zero, at Pokegama on the 25th and 26th. The average precipitation was 1.77, or 0.58 above normal; the greatest monthly amount, 4.80, occurred at Milan, and the least, 0.20, at Belle Plaine. During the whole month all the State has had an abundant covering of snow, which in many places has been blown into immense drifts. The average depth in central portions has been estimated as great as 18 inches.—*T. S. Outram.*

Mississippi.—The mean temperature was 43.7°, or 2.1° below normal; the highest was 76°, at Waynesboro on the 13th, and the lowest, 2° below zero, at Water Valley. The average precipitation was 5.45, or 0.05 below normal; the greatest monthly amount, 8.73, occurred at Fayette, and the least, 2.01, at Thornton. The protracted cold spell at the close of the month, which had its beginning with the arrival of a severe cold wave on the 24–25th, was attended by very light snow, with some sleet; on these dates at a few scattered points, and on the 26th sleet, mixed with snow, fell to a depth ranging from 3 inches in the northern portion to 0.5 inch near the coast. Warmer weather, with general rain, on the last days of the month caused sleet and snow to disappear entirely. Preparations for early market gardening and truck farms, as well as general farming operations, were begun early in the month, and its close found farm work well advanced for the season. The cold weather placed the soil in a mellow condition, and it is being easily broken.—*R. J. Hyatt.*

Montana.—The mean temperature was 20.0°, or 7.0° above normal; the highest was 75°, at Billings on the 18th, and the lowest, 46° below zero, at Poplar on the 23d. The average precipitation was 0.74, or 0.19 below normal; the greatest monthly amount, 2.21, occurred at Columbia Falls, and the least, "trace," at Sun River.—*R. M. Crawford.*

Nebraska.—The mean temperature was 21.8°, or 3.0° above normal; the highest was 66°, at Lexington on the 8th, and the lowest, 22° below zero, at Lodgepole on the 26th. The average precipitation was 0.79, or 0.11 above normal; the greatest monthly amount, 2.50, occcurred at Hartington, and the least, "trace," at Curtis, McCook, and Madrid.—*G. A. Loveland.*.

Nevada.—The mean temperature was 30.2°, or 3.1° above normal; the highest was 65°, at Lovelock on the 6th, and the lowest, 12° below zero, at Wells on the 16th. The average precipitation was 0.92. or 0.48 below normal; the greatest monthly amount, 3.30, occurred at Tylo, and the least, "trace," at Carlin and Hot Springs.—*R. F. Young.*

New England.—The mean temperature was 23.0°, or 1.9° above normal; the highest was 60°, at Somerset, Mass., on the 4th, and at Hyde Park and Boston, Mass., on the 5th, and the lowest, 29° below zero, at Berlin Mills, N. H., on the 31st. Over most of Maine, New Hampshire, and Massachusetts the precipitation was quite evenly distributed, the exceptions being here and there a limited area of large or small totals. In the other States there was mainly a wide difference between the minimum and maximum total falls, especially so in Maine. In that State the range in the monthly amounts was from about 1.4 in the northeastern portion to 5.4 in the west-central portion. Central and southern Maine received a trifle more than the average rainfall; the same is true of New Hampshire, but not of Vermont. In Massachusetts the precipitation was considerably deficient, generally speaking. Providence, R. I., reported the largest amount of the month, 6.24; the smallest was 1.44, at Fort Fairfield, Me.—*J. W. Smith.*

New Jersey.—The mean temperature was 29.0°, or 0.5° below normal; the highest was 64°, at Barnegat on the 3d, and the lowest, 6° below zero, at Franklin Furnace on the 31st. The average precipitation was 2.80, or 1.08 below normal; the greatest monthly amount, 4.21, occurred at Engelwood, and the least, 1.70, at Deckertown. The average depth of snow was largely in excess of the normal.—*E. W. McGann.*

New Mexico.—The mean temperature was slightly below normal; the highest was 76°, at Shattucks Ranch on the 26th, and the lowest, 23° below zero, at Buckmans on the 3d. The average precipitation was slightly above normal; the greatest monthly amount, 2.58. occurred at Chama, and the least, 0.20, at Raton.—*H. B. Hersey.*

New York.—The mean temperature was 22.8°, or 0.4° below normal; the highest was 62°, at Ogdensburg on the 4th, and the lowest, 26° below zero, at Number Four and Ogdensburg on the 25th. The average precipitation was 2.67, or 0.15 below normal; the greatest monthly amount, 6.78, occurred at Palermo, and the least, 0.60, at Eagle Mills.—*R. M. Hardinge.*

North Carolina.—The mean temperature was 37.0°, or 3.0° below normal; the highest was 74°, at Newbern on the 4th, and the lowest, 12° below zero, at Waynesville on the 28th. The average precipitation was 2.30, or 2.00 below normal; the greatest monthly amount, 5.04, occurred at Highlands, and the least, 0.92, at Falkland.—*C. F. von Herrmann.*

North Dakota.—The mean temperature was 3.6°, or 0.6° above normal; the highest was 49°, at Oakdale on the 7th, and the lowest, 38° below zero, at Fort Yates on the 25th. The average precipitation was 0.79, or 0.20 above normal; the greatest monthly amount, 2.04, occurred at Forman and Hamilton, and the least, "trace," at White Earth and Willow City.—*B. H. Bronson.*

Ohio.—The mean temperature was 25.5°, or 1.2° below normal; the highest was 71°, at Lowell on the 4th, and the lowest, 27° below zero, at Levering on the 26th. The average precipitation was 1.93, or 1.04 below normal; the greatest monthly amount, 5.05, occurred at Ashtabula Harbor, and the least, 0.67, at Celina and Warsaw. No uneasiness is felt regarding the effect of the cold wave on wheat, it having been well protected with snow from the 18th to the 31st. The cold wave may have damaged fruit trees, but to what extent is not yet known, it being too early in the season to accurately ascertain.—*H. W. Richardson.*

Oregon.—The mean temperature was 37.9°, or 1.9° above normal; the highest was 68°, at Prineville on the 24th, and the lowest, 9° below zero, at Pendleton on the 26th. The average precipitation was 3.47, or 2.99 below normal; the greatest monthly amount, 12.89, occurred at Glenora, and the least, 0.25, at Silver Lake. The weather was favorable for plowing and seeding and considerable of both was done during the month.—*B. S. Pague.*

Pennsylvania.—The mean temperature was 25.6°, or 2.1° below normal; the highest was 74°, at Cannonsburg on the 3d, and the lowest, 25° below zero, at Saegerstown on the 31st. The average precipitation was 2.15, or 1.35 below normal; the greatest monthly amount, 3.54, occurred at Confluence, and the least, 0.87, at Elwood Junction—*T. F. Townsend.*

South Carolina.—The mean temperature was 42.2°, or 3.8° below normal; the highest was 76°, at Yemassee on the 7th, and the lowest, 3°, at Walhalla on the 28th. The average precipitation was 2.29, or 2.11 below normal; the greatest monthly amount, 4.80, occurred at Holland, and the least, 0.13, at Batesburg. Many lands were plowed preparatory for spring seeding.—*J. W. Bauer.*

South Dakota.—The mean temperature was 11.0°, or about normal; the highest was 64°, at Rapid City on the 8th, and the least, 35° below zero, at Watertown on the 24th. The average precipitation was 1.65, or 1.14 above normal; the greatest monthly amount, 5.69, occurred at Webster, and the least, 0.10, at Edgemont.—*S. W. Glenn.*

Tennessee.—The mean temperature was 35.3°, or 1.5° below normal; the highest was 74°, at Tellico Plains on the 3d, and the lowest, 17° below zero, at Rugby on the 29th. The average precipitation was 3.46, or 1.36 below normal; the greatest monthly amount, 5.16, occurred at Union City, and the least, 1.96, at Benton. The month was warm up to the night of the 24th, when a severe cold wave overspread the State and continued to the 31st, with the coldest weather on the 28th and 29th. This cold period was productive of much suffering among both men and animals, more on account of its length than its severity.—*H. C. Bate.*

Texas.—The mean temperature for the State was 3.6° below the normal; there was a general deficiency throughout the State, which ranged from 0.9° to 5.3° over west and southwest Texas and the coast district, and from 1.1° to 8.7° over the Panhandle and north, central, and east Texas, with the greatest deficit over the Panhandle. The highest temperature was 88°, at College Station on the 10th, and the lowest, 7° below zero, on the 27th. The average precipitation for the State was 0.22 above the normal; it was not very well distributed, there being an excess in some localities, while near by there was a deficiency. On an average it ranged from about normal to 1.68 above, over north, central, and west Texas, and the Panhandle, and from 0.01 to 1.71 above over the northern portion of east Texas, over the western portion of southwest Texas, and over the extreme west and east portions of the coast district; there was a deficiency ranging from 0.10 to 1.32 over the eastern portion of southwest Texas, over the southern portion of east Texas, and over the central portion of the coast district, with the greatest deficit in the vicinity of Luling. The greatest monthly amount, 6.95, occurred at Colmesneil, and the least, 0.15, at Sierra Blanca. The severe cold wave which crossed the

State during the last decade put a stop to all farming work and there was very little being done on the farm at the close of the month. The rain and snow during the latter part of the month put an excellent season in the ground, and with favorable weather farming operations will be rushed. The warm weather during the first and second decades of January was exceptionally favorable for the wheat crop, and prospects for a good crop were never better, but the cold weather, with temperatures near zero over the wheat belt during the latter part of the month, damaged the crop to some extent, especially where the ground was not covered with snow. It is believed that with favorable weather the plant will come out and recover from the effects of the damage sustained by the severe cold weather and a fair crop will yet be made.—*I. M. Cline.*

Utah.—The mean temperature was 26.1°; the highest was 68°, at Frisco on the 6th, and the lowest, 24° below zero, at Fort Du Chesne on the 26th. The average precipitation was 1.53; the greatest monthly amount, 3.80, occurred at Grover, and the least, 0.20, at Woodruff.—*J. H. Smith.*

Virginia.—The mean temperature was 32.7°, or 4.2° below normal; the highest was 70°, at Ashland and Petersburg on the 4th, and the lowest, 15° below zero, at Bristol on the 28th and at Big Stone Gap on the 30th. The average precipitation was 1.94, or 2.44 below normal; the greatest monthly amount, 5.00, occurred at Manassas, and the least, 0.90, at Buckingham and Stanleytown. The month was generally mild and pleasant until the 25th, when a period of cold and stormy weather prevailed, which was unusual for this section. Ice thick enough for harvesting formed in nearly every portion of the State, while sufficient snow to yield good sleighing fell generally.—*E. A. Evans.*

Washington.—The mean temperature was 34.8°, or 0.5° above normal; the highest was 62°, at Dayton on the 22d, and the lowest, 15° below zero, at Waterville on the 26th. The average precipitation was 4.28, or 1.10 below normal; the greatest monthly amount, 15.56, occurred at Clearwater, and the least, 0.83, at Sunnyside.—*G. N. Salisbury.*

West Virginia.—The mean temperature was 28.8°, or about 4.0° below normal; the highest was 69°, at Point Pleasant on the 3d, and the lowest, 18° below zero, at Beckly on the 26th. The average precipitation was 1.70, or 1.50 below normal; the greatest monthly amount, 2.85, occurred at Beverly, and the least, 0.90, at White Sulphur Springs.—*H. L. Ball.*

Wisconsin.—The mean temperature was 15.4°, or 1.4° above normal; the highest was 66°, at Prairie du Chien on the 1st, and the lowest, 38° below zero, at Osceola Mills on the 26th. The average precipitation was 1.98, or 0.70 above normal. The greatest monthly amount, 4.11, occurred at Sharon, and the least, 0.19, at Oshkosh.

Wyoming.—The mean temperature was 1.95, or about normal; the highest was 62°, at Fort Laramie on the 9th, and the lowest, 32° below zero, at Sheridan on the 26th. The average precipitation was 0.55, or about normal; the greatest monthly amount, 2.00, occurred at Sundance, and the least, 0.12, at Fort Washakie.—*M. G. Renoe.*

RIVER AND FLOOD SERVICE.

By PARK MORRILL, Forecast Official, in charge of River and Flood Service.

The *extreme and average stages of water* in the rivers for the current month are given in the following table. Heavy rains and higher rivers are reported in the Ohio Valley but little damage has occurred. The Upper Mississippi and the Ohio were closed to navigation by ice at the end of the month.

The following résumé of river stages and conditions of navigation in the respective streams is compiled from reports by the officials of the Weather Bureau at various river stations and section centers:

Hudson River.—On the first day of January an average of 4 inches of snow covered the watershed area of the Hudson. The mild temperatures of the first four days of the month reduced this depth, and by the 12th practically no snow remained on the ground. The storms of the week ending January 25, which passed down the St. Lawrence Valley, covered the watershed with from 3 to 6 inches of snow, and this was increased by the close of the month to an average of 9 inches on the upper Hudson watershed and 3 inches on the lower watershed area. The foggy and warm conditions of the first week of January honeycombed the ice in the upper Hudson and caused the ice in the river south of Newburg to disappear. During the second week the ice in the harvesting districts was soft and filled with many small holes. Floating ice was observed in the river at Newburg. The thaw of the third week softened the upper Hudson ice and broke up the Lower Hudson fields from Poughkeepsie southward. By the 25th new ice fields formed in the lower Hudson to the thickness of from 3 to 5 inches and those of the upper Hudson received some accretion. The average depth of frost in the ground is 3 feet. The weather and temperature conditions of the Hudson River district during the month were variable, and as a result, the close of the month finds the river ice not in the best condition for housing, except in the northern districts.

Susquehanna River and branches.—No floods occurred in the Susquehanna or any of its branches during the month. Although the rainfall for January averaged, for all reporting stations, double the amount for December the average reading of the gauges for January was slightly lower than that for the preceding month. This was doubtless due to the colder weather of January which caused many of the smaller streams to freeze and the water ordinarily contributed by many springs to be cut off by freezing soon after leaving its source and spread out into sheets of ice, which will continue to expand until the weather moderates and a general thaw releases the water from its frozen state. At Cameron, on Driftwood Creek, the most northwesterly station on the West Branch of the Susquehanna, the stream, which was frozen over on December 27, opened on January 2, but closed again on the 13th and remained closed the rest of the month; at Driftwood, the next station south, the branch had not yet closed at the end of January. At Sinnemahoning, the next point of observation, the water was below zero of the gauge all the month. Cedar Run reports ice from the 10th to the 16th, and again from the 24th to the 31st, with gauge readings below zero all the month. At Keating the river was closed from the 24th to the 31st, and at Renova it froze over December 24 and remained closed till January 5, was opened from the 6th to the 13th, and closed again from the 14th to the 31st. The river at Farrandsville was closed during the whole month while at Lock Haven and Williamsport no ice was reported. The Juniata, at Mifflin closed for the second time this winter on January 12, while at Huntingdon no ice has yet been reported. On the North Branch the river at East Bloomsburg continued at a uniform stage of a little over 2 feet except on the 6th, when a rise of 1.5 feet occurred, followed by a fall of 1 foot on the 7th. Perhaps the most interesting feature of the month was the sudden fall of over a foot at Harrisburg on the 26th and the sharp rise on the 27th. Floating ice was observed on the river from the 1st to the 26th in greater or lesser quantities nearly every day and at times sufficient to cover the whole surface. On the 25th and 26th, when the temperature fell almost to the zero point, the freezing of the springs and streams above Harrisburg suddenly cut off an enormous quantity of water, thus causing a marked fall at Harrisburg. On the following day, owing probably to a considerable volume of water which had been temporarily held in check having been released by warm currents from springs forcing an outlet beneath the ice and possibly to back water from gorges, the river rose higher than it registered before the surface was frozen. At the close of the month the ice averaged 8 inches in thickness at Harrisburg. In the main channel the ice is very rough, having been formed by the gorging of floating ice when the river closed, which occurrence took place at about 4 a. m. on January 27. The ice at Columbia broke up and moved out on January 5, the river having been closed since Christmas night; but it closed again during the month, and at the end of January transfers of passengers were being made by sleighs between Columbia and Wrightsville instead of by the ferry boats which have been in use since the destruction of the bridge by the hurricane of September 29 and 30, 1896.

Rivers of the South Atlantic States.—Owing to the scarcity of precipitation during the month, the James River, already low from deficient rainfall, continued to fall slowly until the 11th, when it reached the lowest point recorded this winter, 0.2 foot below zero of gauge. From this time until the last decade of the month it remained stationary. On the 20th a slight rise occurred under the influence of precipitation occurring at points on the upper watershed, but this was soon checked by freezing weather, which prevented drainage and locked up the tributary streams. This condition lasted until the close of the month, with the river falling slowly. The water was remarkably clear and free from impurities all of the month. Ordinarily any appreciable precipitation in the Rivanna basin will cause that stream to pour a volume of muddy water into the James, which will discolor it for a week or more, and that such was not the case with the precipitation of the 27th and 28th was due to the drainage being stopped by the cold weather prevailing at the time.

The rivers of North Carolina continued low during the greater portion of January. No floods or even sudden and threatening rises occurred. The precipitation occurring from the 1st to the 4th and on the 13th, 14th, and 17th was too small to cause material changes in the stages of the rivers. The heavier rainfall of the 20th and 21st, however, caused a rapid rise on the 22d in the eastern portion of the State, reaching 10 feet in the Cape Fear River, altogether a beneficial rise. The stages resumed their low level at the end of the month, and the

upper courses of all the streams were frozen during the severe cold wave of the 26th to 30th.

All streams in South Carolina remained at a very low stage until the 18th, when they were checked in their downward tendency by the moderate rains of the 14th to 17th. The heavy rains in the upper watersheds of the Wateree and Pedee caused a rise of 9 feet at Camden and 17 feet at Cheraw, thus allowing much freight to be sent down these streams. Ice was running lightly on the Wateree, the upper Pedee, the Lumber, the Little Pedee, the Waccamaw, the Lynch, and the upper Edisto rivers on the 28th to 31st, without injury to navigation. The rivers at Camden and Cheraw were frozen near the shores, to a thickness of 4 inches, on the 28th to 30th. This ice moved down stream on the 31st, without any injurious results so far as heard from. The light snowfall over the northwestern portion of the State on the night of the 27th melted slowly during the 29th and 30th and did not raise the streams over that section to any appreciable extent. The Wateree was navigable from the mouth of the Santee up to Camden during the entire month. The Pedee from Smiths Mills to Cheraw was navigable only from the 20th to the 31st; from the 1st to the 19th it was below a 3-foot stage. On the lower Pedee, from Georgetown to Smiths Mills, navigation was uninterrupted throughout the month. On the Congaree, below Granby, there was sufficient water for navigation purposes. Practically no logging was done upon the Edisto until the 21st, after which date much of the timber cut several months before was successfully rafted downstream. The observer at Kingstree, on the Black River, reports that during the last decade of the month upwards of 120 rafts were sent past that place to Georgetown.

The Savannah River continued at a nearly normal stage until the 15th, when a rise of 5.6 feet occurred at Augusta, due to heavy rains in the lower watershed of the up-river country. After that there were irregular changes in the river stages until the 26th, when, on account of heavy rains over the greater portion of the Savannah Valley, a 24-hour rise of 10.6 feet was recorded. At no time during the month was the river low enough to hinder navigation, nor was it sufficiently high to interfere with the regular boat traffic or endanger the river bottom lands.

No great changes occurred in the other Georgia rivers during the month. The most notable feature was the continued low stage of the water. It was stated by several observers that the water has averaged lower than for any January during the past twenty-five years, and this statement is borne out by the Weather Bureau records. The low stage of water in the rivers of this section is due to the marked deficiency in rainfall throughout their drainage areas during the past year. The most decided changes during the month were a rise of 6.2 feet in the Chattahoochee at Eufaula on the 20th and of 5.2 feet on the same date in the Oostanaula at Resaca. These rises were due to heavy rains in the vicinity of the stations, which are shown to be purely local by the sudden and short duration of the rises, these lasting less than twenty-four hours. Floating ice was noticed in the Oostanaula at Resaca on the 28th, and during the last three days of the month the river was frozen entirely across, but the ice was not of sufficient strength to support the weight of a man. The same was true on the same river at Rome, Ga., on the 30th and 31st. The Chattahoochee, which is navigable when the gauge at Columbus shows 2 feet, was open to navigation from the 16th to the 27th of the month.

Mobile River and branches.—The Alabama River and tributaries were low during the first half of the month, when the rains were so light and scattered as to hardly affect the rivers, and barely navigable stages existed as far up as Selma, above which point there was but a barge-water stage. General and heavy rains over the Alabama watershed on the 14th and 15th gave higher rivers than at any time since last March, and good navigable stages prevailed during the last half of the month, though the highest water at Montgomery was not more than the average January stage. Intensely cold weather prevailed over this section from the 26th to 30th, when the ground was frozen, but no ice worthy of mention formed in the rivers, except at Rome, Ga., on the 30th, when the river at that point was nearly covered with ice. River men agree that the protracted period of low water which prevailed in the rivers of this section through most of last summer and fall and up to the middle of January is without precedent in the last twenty-five years, and that, in consequence, thousands of bales of cotton which would have been handled cheaply by river had to be hauled many miles to the railroads.

The Tombigbee River and tributaries remained at unusually low stages the greater portion of the month. The rain which fell, while causing marked rises in all the rivers, was at such intervals that navigation was aided but little, owing to the fact that while the rivers rise rapidly from the effect of a general rain, yet if not reinforced at short periods it runs off as rapidly. The rain on the 1st, reinforced by the heavy rain over the State during the 3d, caused continued though moderate rises in all the rivers until the 7th. From this time the rivers changed but slightly until the 11th, when a general fall occurred to the 14th. General and moderately heavy rain on the 15th to 18th caused decided rises in the lower Tombigbee until the 22d, followed by falling water from the 23d to the close of the month. The following clipping from the Mobile Daily Register for January 14, 1897, is interesting: "The steamboat *Hard Cash* failed to go as high as Demopolis on her last week's trip on account of low water. We doubt if the oldest resident on the Tombigbee River remembers as low a stage of water in the month of January as exists at this time. We feel certain that it has not been the case for fifty years. In the winter of 1854–55 the river did not get in good boating order at any time during the season, but larger boats than any on the river at this time went as high as Demopolis the whole season."

Ohio River and branches.—During the greater part of the month large quantities of ice were passing out through the Alleghany at Pittsburg while the Monongahela remained comparatively clear, due, no doubt, to its more southerly origin. As the colder weather of the latter part of the month approached, however, ice began to form rapidly in both streams and their tributaries and navigation closed entirely on the 25th. For the remainder of the month the rivers were entirely closed by the ice, the harbor alone being kept clear by the ice-boats as far upstream as the first dam in each river. At the end of the month about 5,000,000 bushels of coal bound for southern ports lay in the Pittsburg harbor awaiting the opening of the upper Ohio.

In the earlier part of the month navigation was unimpeded at Parkersburg, save for a day or two following the 13th, on which date the mountain rivers were frozen over. This ice was broken up on the next day and was carried down the Ohio during the 14th and 15th, and slightly interfered with navigation on that river. The Ohio during this period was unusually free from obstructions, and the prevailing good stages of water gave excellent opportunity for boating. The severe cold wave during the last decade closed navigation on the 25th, and it so remained at the end of the month. Ice formed on the rivers to a thickness of from 4 to 6 inches, on still water to a thickness of from 6 to 8 inches.

The remarkably good stage of water and the unusual activity in river traffic at Cincinnati for the winter season continued until January 27, when navigation was suspended on account of increasingly heavy floating ice and the fear of a freeze-up. The timely Weather Bureau warnings of the approach of colder weather, the gradually increasing severity of the cold, the persistent duration of very low temperature from the 23d to the 30th, and the fair stage of water carrying along the rapidly moving floes of ice afforded the opportunity to prepare against an anticipated closing of the river. Notwithstanding the severe weather during the latter part of the month, which caused complete suspension of river traffic, the supply of coal is abundant. With the exception of the *City of Louisville*, which on the 28th of the month fought her way through the floating ice with some trifling damage to her wheel buckets back from Louisville to Cincinnati where she tied up, there was no steam navigation between Louisville and Pittsburg after the 27th of the month. The floating ice has caused the loss of about one week between Cincinnati and Louisville and about 10 days in the upper river. At Cincinnati the harbor boats have broken up the great ice floes, in which they were materially assisted by the numerous bridge piers, and steamers secured to the banks have kept their wheels revolving. No loss or damage has been sustained. Ice is estimated at from 3 to 4 inches in thickness on the river; in neighboring ponds and lakes it is from 5 to 6 inches thick. Gorges were formed at various points up the river and on the 31st a partial gorge formed against the southern piers of the upper bridge, that of the Louisville and Nashville Railway, at this point. This was considered as favorable for the harbor. With the approaching warmer and rainy weather it is believed that the ice will be carried away without damage to river craft and river men are exerting great activity in view of the resumption of navigation.

At Louisville the stages of water in both the Ohio and Kentucky rivers were very favorable for traffic up to the 26th. While the greater part of the winter's supply of coal had arrived, some belated fleets came in during the month and the usual traffic was not interrupted until the above date, when navigation was impeded to some extent by the thin ice which formed under the influence of the cold wave. On the 27th the river was full of floating ice, which caused the partial suspension of navigation. From the 28th to the close of the month the ice formed a dense pack, which extended from the falls to a distance of several miles above the city and caused a total suspension of navigation; not even the ferry boats plying between Louisville and Jeffersonville were able to force their way through the mass. The boats in the harbor sought refuge in the canal and extraordinary precautions were taken to prevent the coal fleets moored above the city from being swept away when the ice breaks. The same conditions obtained in the Kentucky river, where extensive rafts of logs are endangered. Several boats have been caught in the ice and apprehension is felt for their safety.

An ice gorge, 18 miles in length, formed in the Ohio at Evansville on the 11th, and, by damming the river, caused the current to flow across the country from a point above that city, reentering the channel near Henderson. Serious apprehension was felt for a time that the river would be permanently diverted, but the gorge gave way on the next day and the ice passed out.

At Cairo the river at the 1st of the month was falling, but came to a stand by the morning of the 4th. An unusually rapid rise in the Mississippi, starting in at St. Louis on the 3d, commenced to be felt at Cairo on the 5th, and backed the water up the Ohio, causing a rise at

Cairo of 16.8 feet during the subsequent five days. From the morning of the 5th to the morning of the 6th the river rose 8.2 feet, and this rise also affected the river as far up as Paducah, Ky., where the stage of water increased 8.0 feet from the 5th to the 9th. No very marked changes in height of water occurred at Evansville during the month, and a good stage was maintained from Evansville down. Ice began forming in the river at Evansville on the 26th and all boats sought harbor in Green River. Heavy floating ice on the 29th caused complete suspension of navigation, and ice was piled 3 or 4 feet high along the levee. No boats were running at Evansville at the end of the month. At Cairo on the 27th, on account of heavy floating ice in the Mississippi, all packets and freight boats went to the bank. Heavy floating ice was present in the Ohio from the 29th to the 31st, during which time navigation was suspended. Transfer boats continued to transfer trains across the Ohio, but those that run to Birds Point, Mo., could not make landings at the inclines and had to transfer passengers without the cars. Many boats and barges were transferred to the Kentucky shore at East Cairo, where there is the best ice harbor between Cairo and Paducah on the Ohio and Chester and Memphis on the Mississippi.

During the first fifteen days of the month navigation was closed on the upper Tennessee to all large boats and on the Clinch River to all boats because of low water. On the 3d and 4th rain fell over the watershed, ranging from one to three-fourths of an inch, but had very little effect on the river; on the 13th rain began and continued, with from one to two days' intermission, up to the 21st, causing the river to rise and opening navigation to all boats on the 14th. The river men state that very little business was done the first half of the month on account of low water, and at the end of the month business was suspended on account of the running ice. At Loudon navigation was suspended throughout the month from low water and ice. No boats entered the Clinch River after the 27th on account of ice, which began to form at Kingston that day, and on the 28th the ice was coming together and lodging fast. The Tennessee River had floating ice from the evening of January 29 to morning of January 31 from Riverton to Knoxville. Mush ice was passing Loudon from the 27th to 31st. The Hiwassee had running ice from the 28th to 31st. Ice formed along the shores at Chattanooga and Bridgeport on the 29th and at Chattanooga on the 30th. The ice was 2 inches thick and extended 15 feet from shore. The running ice ceased to pass Chattanooga during the 31st, and the river men feared that an ice gorge was forming and would not send out their boats until further information could be obtained. On the 30th the Clinch was frozen over at Clinton, and on January 30th, for the first time in ten years, the Duck River was frozen over at Centerville. The ice began to break up at Knoxville on the 30th and 31st. No damage occurred to any property on or along the river during the month. The great deficiency in rainfall during the past three months has been very unfavorable to boating interests on the Tennessee River.

The month opened with low stages in the Cumberland River, but moderate rains on the 3d caused a steady but slow rise until the 9th. After this the river declined gradually until the 14th, when heavy general rains brought it up to a maximum of 21 feet at Nashville, 16 at Carthage, and 18 at Burnside. The balance of the month was characterized by a slow but steady fall. Floating ice was observed at Nashville and Carthage from the 29th to 31st. Navigation was suspended from the 1st to the 14th between Carthage and Burnside on account of low water, and between Nashville and Carthage from the 1st to 3d for the same cause. Boats ran to lower points all the month except on the 29th to 31st, when floating ice caused total suspension of navigation.

Mississippi River and minor branches.—The Mississippi and Minnesota rivers from St. Paul up to their sources remained frozen over all the month and gauge readings were impracticable, but from occasional inspection of the river it was apparent that the average stage of water ranged from 2.5 to 3.5 feet at St. Paul. These figures are estimated to be from 1 to 2 feet above the average January stage for the last ten years, and they certainly indicate 3 to 4 feet above that of the corresponding month of 1896, when the water was below zero of the gauge all the time. According to all reports, the lakes and marshes in the watersheds of these rivers have been replenished by the copious rains of 1896 and especially by the excessive precipitation of October and November, to an extent surpassing anything known since 1888. These reservoirs of water have been drying up and disappearing to an alarming extent for the past ten years; but now it is said that nearly all of them have been restored to the proportions that they presented in 1880–81, when water was very abundant and the maximum river gauge reading of 19.5 feet was registered at St. Paul (April 29, 1881). When the mild condition of last December is considered, with its frequent thaws, continuing into the early part of January, it is certain that a considerable part of the snow and ice over the watersheds of these rivers has been reduced to water, which has already passed off down the river. Hence, even though conditions approaching closely to those of the time of the great flood in 1881 exist, the chances of another one the coming spring are lessened.

The average date of the closing of the Mississippi at La Crosse is December 5, but this season the river did not freeze over until January 24. This is the latest date of closing since 1874. The river was frozen nearly to the channel from the 1st to the 24th. The ice harvest began on the Mississippi River at this point on the 18th, and on the Black and La Crosse rivers on the 20th. The river in its present frozen condition affords an excellent road for farmers of the surrounding country to bring their produce to town, and in consequence business has been somewhat enlivened.

The river was open at Dubuque until the 22d and then froze over quickly, and by the 25th the ice near the channel was 5 to 8 inches thick. There was a steady rise at this point after the 12th, the river reaching 8.2 feet, a remarkable stage for this time of year and an unusually high stage for the river freezing, it being the highest of which there is any record. At Davenport the river remained open until the 27th. From 8 a. m. of the 26th to noon of the 27th the water rose 6.5 feet and reached a stage of 10 feet, due principally to an ice gorge forming below the city; the river froze over at that stage. This is also an unprecedented stage at time of freezing. The river froze over at Muscatine on the 26th, at which time it had reached a stage of 7.0 feet. It is thought that the freezing over of the river at this high stage is likely to cause ice gorges and very high water when the ice breaks up and goes out.

Floating ice was running at Keokuk from the 4th to the 16th, when the ice was dissolved by warm rains. New ice began forming on the 18th, growing steadily heavier until the river closed during the night of the 28–29th. Wherever excavations are made it is noticed that the ground is moist to a depth of 4 feet, while usually at this season the moisture extends but 6 or 7 inches. It might be inferred from this condition of the soil that less of the spring rains would be absorbed by the land and a greater amount be drained off into the water courses.

The severe storm which passed over the Mississippi Valley on the 2d and 3d caused an enormous amount of rain to fall in the Mississippi and lower Missouri watershed, the fall in Missouri and southern Illinois having been particularly excessive. The combined effects of the heavy rains in the Illinois, Mississippi, and Missouri valleys began to be felt at St. Louis on the 3d, and on the morning of the 4th the water marked 20 feet on the gauge, a rise of 13.2 feet in twenty-four hours and with one exception the greatest 24-hour rise in the history of the station. On January 7 a crest of 24.8 feet was reached, which is the highest recorded stage for the month of January, the next highest having been 17.5 feet on January 7 and 8, 1876, and on January 20, 1885. On the 5th the water broke through the cross levee at Willow Slough, a short distance from Quincy, and the surrounding country was submerged. The upper Illinois River Valley was also overflowed, the water at Peoria remaining above the danger line continuously from the 7th to 27th. Immense amounts of alluvial soil were brought down from the Missouri River, and a mud deposit of over 2 feet in thickness formed on the levee at St. Louis in twenty-four hours.

The first running ice of the month was reported at Burlington, Iowa, on the 4th, at Hannibal on the 5th, and at Louisiana, Mo., on the 6th, when the ferryboat at the latter place went into winter quarters. On the 8th the Mississippi at Hannibal was filled with running ice. By the 11th, owing to higher temperature, the ice had thinned out considerably as far south as Warsaw, but was still running heavy at Hannibal. On the 13th the river at the latter place was blocked at the bridge for a short time but soon commenced running again. On the 7th thin ice appeared at St. Louis but by evening had disappeared. On the 15th thin ice again commenced running past St. Louis but did not continue for more than a day. On the 24th ice commenced to run on the east side of the river at St. Louis and by the 25th was quite heavy. The Illinos River was frozen over at Beardstown on the 25th. On the 26th ice cutting was begun at Burlington and the river closed a few miles above Warsaw. On this date ice commenced running out of the Missouri River. Heavy ice continued running past St. Louis and navigation was suspended by the packet companies, although the transfer boats continued to make trips with the assistance of tugs. Navigation at St. Louis was totally suspended from the 27th to the 31st, and on the 28th the shore ice was over 4 inches in thickness. The ice commenced to thin out on the 29th, and by the 30th it was becoming soft and mushy. That the Mississippi was not gorged at many more places, and especially at St. Louis, was probably due to the swift current caused by the abnormally high stage of water.

Floating ice passed Chester from the 25th to the 31st and was observed at Cairo late in the afternoon of the 25th, becoming heavy by the morning of the 28th. Navigation was practically suspended on the Mississippi at Cairo after the 27th and continued closed at the end of the month.

The month opened with a fair stage of water south of Cairo. Between the 4th and 9th a rise of about 15 feet occurred at Cairo, which reached Memphis two days later, and Vicksburg five days after the flood crest had passed Memphis. A second and less important rise occurred between Memphis and Vicksburg from the 20th to the 28th, after which the water fell rapidly to the close of the month. The rapid rise in the river caused no serious inconvenience, except to a few contractors, who were engaged in removing sandbars, and the full volume of river traffic was kept up on the Mississippi and its tributaries until impeded by floating ice, which made its appearance at Mem-

phis on the 20th, at 5 a. m., and practically closed navigation in this section. The ice, which filled the entire navigable portion of the river, came in immense cakes, from 8 to 10 inches in thickness, and moved with great rapidity, making it extremely hazardous to attempt the movement of boats. Being warned three days in advance of the approach of the ice, boats northbound were turned back and tied in sheltered positions, and it is owing to these precautions that no serious damage occurred, the greatest loss being from the delay in shipment of freight.

Good boatable water existed in the Mississippi and its tributaries south of Memphis during the month for the most part; navigation on the upper White River, however, has been suspended, owing to low water. Considerable drift was reported in the Yazoo and running ice in the Mississippi as far south as Helena during the latter portion of the month, impeding navigation somewhat. The rise in the Mississippi was of great benefit at Vicksburg, especially to the lumber and coal interests, and it permitted boats to utilize the canal for landing at the city front, although much drift floated into the canal from the Mississippi during the rise. The tributaries are free from ice. The fluctuations in the river south of Vicksburg were confined to a general slight decline for the first ten days of the month, after which a marked rise of 5 feet occurred at New Orleans. The fluctuations at New Orleans after the 20th amounted to less than 2 feet, the highest water of the month occurring on the last day.

Heavy rains during the early part of the month caused marked rises in the Red River, Fulton showing a nearly 21-foot rise in the first week, Shreveport a 12-foot rise by the 10th, and Alexandria a 16-foot rise by the 21st. From June 15, 1896, to the beginning of January, 1897, with the exception of some days in December, navigation on the Red at Shreveport was practically suspended because of low water. Consequent upon the notable rains on the upper Red during the first few days of January, the river began to rise on the 3d, and by the 6th was of sufficient height at Shreveport to admit the *Valley Queen* (the largest steamer that ascends to this point) with a cargo of cotton, this being her first trip since April 30, 1896. The close of the month saw a falling river, but smaller craft plied without any trouble.

The fluctuations in the Ouachita were marked, particularly in the upper river. Camden had a rise of 26 feet between the 2d and 7th, followed by a fall of 19 feet by the 16th, and a second rise of 16 feet by the 21st, after which there was a fall of 18 feet to the close of the month. A rise commenced at Monroe on the 2d, amounting to 13 feet by the 7th, after which the rise was gradual to the close of the month, reaching a total of nearly 22 feet.

Missouri River and branches.—The Missouri River and its tributaries above Sioux City continued frozen over throughout the month. From the beginning of the month to the 23d the river southward to Kansas City disclosed nothing of special interest, but on the 23d it was frozen over as far southward as the mouth of the Platte, and this condition continued the remainder of the month. At the close of the month the average thickness of ice on the river at Omaha was 12 inches.

A small quantity of floating ice appeared at Kansas City during the first days of the month, and a partial jam formed above the Hannibal bridge and in the mouth of the Kaw on the 6th, 7th, and 8th, giving way on the 9th upon the return of mild temperature. After this date there was a variable amount of floating ice until the 28th, when the river became blocked both above and below the bridge and remained so to the close of the month, with a quarter of a mile clear in the neighborhood of the bridge. The ice in the Kaw thickened much faster than in the Missouri, and is 7 inches thick at the end of the month.

On January 3 the Osage rose in twenty-four hours 17.9 feet to a 21-foot stage and reached a stage of 30.4 feet two days later. At Arlington the Gasconde rose in twenty-four hours 21.4 feet to a 20-foot stage, and reached a stage of 24.2 feet two days later. These stages were unprecedented for the time of year, and caused great damage in the Osage and Gasconde valleys. The town of Linn Creek, Mo., on the Osage River was completely submerged and a ferryboat plied through the principal streets carrying supplies. At Osceola, Mo., further up the same river considerable damage was also done.

Arkansas River.—The heavy rain of the 1st and 2d raised the Arkansas at Fort Smith to a navigable stage which continued during the month. The Kansas City, Pittsburg, and Gulf Railroad bridge recently constructed over the Arkansas River at Redland, 25 miles west of Fort Smith, has created such a strong current with a rising river that navigation at that point has been very greatly imperiled. The current thus created is believed to be not less than 14 miles an hour. A large quantity of driftwood and large logs of cottonwood floated down the river with the rise of the 4th and 5th. The severe cold wave which prevailed from the 25th to 29th interfered with navigation. Shore ice had formed on both banks on the morning of the 28th, and extended well into the channel on the morning of the 29th, being 6 inches thick in some places. At 5 p. m. of the 29th the ice on the north bank was broken up and dislodged, and great quantities of soft, broken ice and slush floated down the river on the 28th and 29th. An immense ice gorge, the top of which was 15 feet above the surface of the river, formed at Wilsons Rock where the river is deep and narrow. This gorge was 14 miles long and still exists, but being of a spongy nature, all apprehension of danger has been dispelled.

The rise in the river was felt at Dardanelle and Little Rock on the 3d; the maximum stage at Little Rock, 19.6 feet, occurred at 11 a. m. of the 7th when the river was within 3.4 feet of the danger line. The water began falling at Fort Smith and Dardanelle on the 7th and at Little Rock on the 8th. The river carried considerable drift from the 4th to 7th but not heavy. Light floating ice passed Little Rock on the 30th and 31st. Navigation of the upper river closed on 28th on account of ice and remained closed to the end of the month. On the lower river navigation was pursued uninterruptedly during the month. The average stage of river at Little Rock was the highest since February, 1896.

Rivers of the Pacific Coast.—The Columbia River has been open to navigation throughout the entire month. The weather being mild there was no formation of ice until the last week of the month, when a small amount was formed on the upper river but not sufficient to stop navigation. Navigation also continued on the Clear Water and Snake rivers, though the water was low but not below the average for the month. The Willamette River continued at its normal stage throughout the month; there was no ice, as there seldom is, in the Willamette.

In both the Sacramento and San Joaquin valleys the rivers continued at a moderate stage. The last two days in January there was heavy rainfall and the rivers have begun to rise rapidly. The swamp or tule lands along the Sacramento have had their basins pretty well filled with water from the various sloughs along the river. The lands which are overflowed and thereby damaged are reclaimed lands from the tule basin along the river. As a rule the large grain farms along this stream are leveed entirely by their owners, there being no regular and systemitized levee system. The overflow does not necessarily cause damage because the land must have a generous soaking before it will be in a proper condition for tilling during the long, dry summer.

Heights of rivers above zeros of gauges, January, 1897.

Stations.	Distance to mouth of river.	Danger-line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Paul, Minn.†	1,934	14	.....	.....	.....	.....	.....	.....
Reeds Landing, Minn.†	1,864	12	.....	.....	.....	.....	.....	.....
La Crosse, Wis.†	1,799	10	.....	.....	.....	.....	.....	.....
North McGregor, Iowa†	1,739	18	.....	.....	.....	.....	.....	.....
Dubuque, Iowa[a]	1,679	15	8.2	22	2.8	11	4.5	5.4
Leclaire, Iowa	1,589	10	.....	.....	.....	.....	.....	.....
Davenport, Iowa[b]	1,573	15	7.3	27	1.4	14	3.4	5.9
Keokuk, Iowa[c]	1,443	14	6.0	4	1.2	28	3.2	4.8
Hannibal, Mo	1,382	17	11.0	4	0.1	28,29	4.4	10.9
Grafton, Ill	1,284	23	17.0	6	4.9	31	9.5	12.1
St. Louis, Mo.[d]	1,241	30	24.8	7	5.6	31	13.4	19.2
Chester, Ill.[d]	1,170	30	21.6	8	3.6	1	10.4	18.0
Cairo, Ill	1,073	40	28.2	9	11.4	3,4	21.7	16.8
Memphis, Tenn	843	33	19.8	11	5.0	5	13.7	14.8
Helena, Ark	767	37	25.8	12,13	9.8	7	19.7	16.0
Arkansas City, Ark	635	42	28.7	29,30	11.8	5,6	22,4	16.9
Greenville, Miss	595	40	24.3	30	9.6	5,6	18.8	14.7
Vicksburg, Miss	474	41	26.7	31	9.7	7	19.4	17.0
New Orleans, La	108	13	8.8	31	3.4	10	6.3	5.4
Arkansas River.								
Fort Smith, Ark.[e]	345	22	18.6	5	2.2	1	7.6	16.4
Dardanelle, Ark.[f]	250	.....	17.4	6	1.6	1,2	7.6	15.8
Little Rock, Ark	170	23	19.4	7	3.4	2	9.8	16.0
White River.								
Newport, Ark	150	21	27.9	7	0.9	1	16.3	27.0
Illinois River.								
Peoria, Ill	135	14	14.9	10,11	5.5	1	12.7	9.4
Missouri River.								
Bismarck, N. Dak.†	1,301	14	.....	.....	.....	.....	.....	.....
Pierre, S. Dak.†	1,006	14	.....	.....	.....	.....	.....	.....
Sioux City, Iowa†	676	19	.....	.....	.....	.....	.....	.....
Omaha, Nebr.[g]	561	18	10.1	27,28	5.2	4	9.1	4.9
Kansas City, Mo.	280	21	9.7	31	6.5	1-4,27	7.5	3.2
Boonville, Mo	191	20	10.2	5	3.7	31	6.8	6.5
Hermann, Mo.[h]	95	21	14.3	4	1.0	1	7.1	13.3
Ohio River.								
Pittsburg, Pa	966	22	7.3	7	2.3	25	4.2	5.0
Davis Island Dam, Pa	960	25	8.5	7	4.0	28	6.0	4.5
Wheeling, W. Va.[i]	875	36	9.9	8	5.4	16	7.5	4.5
Marietta, Ohio[j]	795	25	10.3	8	5.8	17	8.2	4.5
Parkersburg, W. Va.	785	38	10.5	8,9	6.8	17,18	8.8	3.7
Point Pleasant, W. Va.[j]	703	36	10.8	23	3.0	31	7.8	7.8
Catlettsburg, Ky	651	50	.....	.....	.....	.....	.....	.....
Portsmouth, Ohio	612	50	.....	.....	.....	.....	.....	.....
Cincinnati, Ohio	499	45	17.8	25	9.3	3	14.4	8.5
Louisville, Ky.[k]	367	24	8.1	25	5.4	4	6.9	2.7
Evansville, Ind	184	30	15.9	23	6.8	5	11.5	9.1
Mount Vernon, Ind.[l]	.....	35	16.5	23,24	6.5	5	8.7	10.0
Paducah, Ky	47	40	19.8	24	6.5	3,4	13.5	13.3
Alleghany River.								
Warren, Pa	177	7	3.5	6	0.9	{15-18/ 29-31}	1.5	2.6
Oil City, Pa	123	13	3.8	6	1.8	1,30,31	2.4	2.0
Parker, Pa	73	20	4.0	8	1.4	1	2.5	2.6
Freeport, Pa	26	20	7.0	7	2.9	15	4.7	4.1
Conemaugh River.								
Johnstown, Pa.[m]	64	7	2.6	5	1.2	16	1.7	1.4
Red Bank Creek.								
Brookville, Pa	35	8	.....	.....	.....	.....	.....	.....
Beaver River.								
Ellwood Junction, Pa	10	14	2.8	1-6	1.8	30,31	2.2	1.0
Big Sandy River.								
Louisa, Ky	26	20	6.9	24	3.3	13,14	4.9	3.6

Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger-line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Cumberland River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Burnside, Ky	434	50	18.0	15	0.8	3	5.1	17.2
Carthage, Tenn	257	30	15.9	18	2.0	3	6.8	13.9
Nashville, Tenn	175	60	20.9	18	3.0	3	10.1	17.9
Great Kanawha River.								
Charleston, W. Va	61	30	5.8	23	3.2	29-31	5.0	2.6
New River.								
Radford, Va	153	14	1.0	22, 23	0.3	13, 14	0.5	0.7
Hinton, W. Va	93	14	2.6	23, 24	1.1	30, 31	1.9	1.5
Licking River.								
Falmouth, Ky. [a]	30	25	6.5	21	1.6	11-14	2.9	4.9
Miami River.								
Dayton, Ohio	69	18	2.8	5	1.2	2, 3	1.6	1.6
Monongahela River.								
Weston, W. Va. [a]	161	18	1.5	5	0.0	(1-4, 8-20) (26-28)	0.2	1.5
Fairmont, W. Va	119	25	4.4	19	1.3	15, 16	2.2	3.1
Morgantown, W. Va. [a]	93	20	10.0	19	7.5	14, 15	8.3	2.5
Greensboro, Pa. [a]	81	18	10.5	19, 20	7.6	31	8.6	2.9
Lock No. 4, Pa	40	28	10.8	19, 20	6.7	29-31	8.4	4.1
Cheat River.								
Rowlesburg, W. Va. [a]	36	14	5.5	18	2.4	1	2.4	3.1
Youghiogheny River.								
Confluence, Pa	50	10	3.9	5, 18	1.5	16, 30	2.4	2.4
West Newton, Pa	15	23	3.4	22	1.0	1, 2, 16, 17	2.0	2.4
Tennessee River.								
Knoxville, Tenn	614	29	2.5	15, 16, 18	0.8	3, 10-13	1.7	1.7
Chattanooga, Tenn	430	33	7.3	23	2.4	1, 13	4.4	4.9
Bridgeport, Ala	390	.....	5.6	22, 23	1.1	1-4	2.9	4.5
Florence, Ala	230	16	6.5	23	1.0	3	3.3	5.5
Johnsonville, Tenn	94	21	10.6	22, 23	2.6	4	5.8	8.0
Rockwood, Tenn	519	20	6.1	22	1.7	12, 13	3.4	4.4
Wabash River.								
Terre Haute, Ind. [a]	165	16	14.5	6, 7	1.7	1	8.7	12.8
Mt. Carmel, Ill. [b]	50	15	13.9	23	2.9	2	9.7	11.0
Red River								
Arthur City, Tex	688	27	20.6	4	2.6	1	6.0	18.0
Fulton, Ark	565	28	21.8	7	1.2	1, 2	10.0	20.6
Shreveport, La	449	29	10.0	11	−1.8	1, 2	6.8	11.8
Alexandria, La	139	33	15.0	21, 22	−0.9	1	9.7	15.9
Atchafalaya River.								
Melville, La	100	31	25.0	31	13.2	1	19.9	11.8
Ouachita River.								
Camden, Ark	340	39	30.5	8	4.1	1	19.3	26.4
Monroe, La	100	40	24.6	30, 31	2.8	1	18.7	21.8
Yazoo River.								
Yazoo City, Miss	80	25	7.6	31	−1.8	1, 2	3.8	9.4
Tombigbee River.								
Columbus, Miss	285	33	6.0	19	−2.7	1	0.7	8.7
Demopolis, Ala. [a]	155	35	20.6	22	−0.9	1-3	7.1	21.5
Black Warrior River.								
Cordova, Ala	155	20	11.7	18	2.2	1-3	4.8	9.5
Tuscaloosa, Ala	90	38	19.3	19	0.3	1	6.5	19.0
Alabama River.								
Montgomery, Ala	265	35	13.0	22	0.4	2, 3	3.7	12.6
Selma, Ala	212	35	14.8	23	0.2	1, 2, 15-17	4.0	14.6

Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger-line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Coosa River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Rome, Ga	235	30	9.5	22	0.9	11-13	2.9	8.6
Wilsonville, Ala	66	15	.....	.....	.....	.....	.....	.....
Tallapoosa River.								
Sturdevant, Ala	69	15	.....	.....	.....	.....	.....	.....
Savannah River.								
Augusta, Ga	130	32	20.8	22	5.8	13	9.0	15.0
Edisto River.								
Edisto, S. C	75	6	4.7	22	2.4	12, 13	3.4	2.3
Congaree River.								
Columbia, S. C	37	15	7.0	22	0.8	3, 8-13	2.2	6.2
Santee River.								
St. Stephens, S. C	50	12	7.8	31	2.0	14	4.5	5.8
Wateree River.								
Camden, S. C	45	24	18.0	22	3.1	8	5.7	14.9
Black River.								
Kingstree, S. C	60	12	6.6	30, 31	3.3	14	5.2	3.3
Great Pee Dee River.								
Cheraw, S. C	145	27	21.4	22	1.8	13	4.3	19.6
Linch Creek.								
Effingham, S. C	35	12	7.6	30	4.4	13	5.5	3.2
Lumber River.								
Fairbluff, N. C	10	6	4.0	1	2.9	31	3.2	1.1
Waccamaw River.								
Conway, S. C	40	7	5.3	1	2.2	17	3.4	3.1
Cape Fear River.								
Fayetteville, N. C	100	38	24.0	23	4.0	13	7.7	20.0
James River.								
Lynchburg, Va. [a]	257	18	1.0	22, 23	0.4	1-4, 10-13	0.6	0.6
Richmond, Va	110	10	.....	.....	.....	.....	.....	.....
Potomac River.								
Harpers Ferry	170	16	.....	.....	.....	.....	.....	.....
Susquehanna River.								
Wilkesbarre, Pa	178	14	.....	.....	.....	.....	.....	.....
Harrisburg, Pa	70	17	3.7	7-9	0.5	26	2.5	3.2
W. Br. of Susquehanna.								
Lock Haven, Pa	63	.....	2.0	8	0.5	27-31	1.1	1.5
Williamsport, Pa	35	20	3.9	6	1.4	21	2.3	2.5
Juniata River.								
Huntingdon, Pa	80	24	4.9	5	3.4	22-31	3.6	1.5
Sacramento River.								
Redbluff, Cal	241	23	14.0	29	2.0	20-27	4.1	12.0
Sacramento, Cal	70	28	20.0	31	14.5	28, 29	16.3	5.5
Willamette River.								
Eugene, Oreg	149	10	7.6	1	3.2	17	4.5	4.4
Albany, Oreg	99	30	10.8	2	4.2	18	6.0	6.6
Salem, Oreg	69	20	9.6	1	7.4	16, 26	8.1	2.2
Portland, Oreg	10	15	8.7	3	3.0	15, 16	5.5	5.7

[a] Distance to the Gulf of Mexico. [b] Frozen. [c] Frozen 23-31. [d] Frozen 28-31. [e] Frozen 29-31. [f] Frozen 26. [g] Frozen 29. [h] Frozen 30-31. [i] Frozen 28-31. [j] Frozen 5-9. [k] Frozen 25-31. [l] Frozen 25-31. [m] Frozen 28-31. [n] Frozen 25-31. [o] Frozen 26-31. [p] Frozen 28-31. [q] Frozen 29-31. [r] Frozen 13, 25-31. [s] Frozen 25. [t] Frozen 15, 16, 25, 31. [u] Frozen 25-31. [v] Frozen 29-31. [w] Frozen 26-31. [x] Frozen 31. [y] No observation 15-18.

SPECIAL CONTRIBUTIONS.

CLOUD OBSERVATIONS AND MEASUREMENTS AT THE BLUE HILL METEOROLOGICAL OBSERVATORY, MILTON, MASS.

Communicated by A. LAWRENCE ROTCH, Director (dated February 22, 1897).

Nephoscope observations of direction and relative velocity are made on Blue Hill three times a day in cooperation with the network of stations of the United States Weather Bureau. Nephoscope observations have been made on Blue Hill three times a day, or oftener, since 1887.

There are three theodolite stations in the same straight line, furnishing three bases, respectively of 2,590 meters, 1,178 meters, and 1,412 meters, from the ends of some one of which simultaneous observations for height and velocity are made twice a day when conditions permit. These observations were re-commenced May 1, 1896, and have been obtained on about eighty days in each one hundred. The differences in level between the ends of the base lines are 189, 126, and 63 meters, in the order given above. Two of the theodolites are similar to those first used by Mohn for measuring auroras, and the third theodolite is a surveyor's transit remodeled to conform to this pattern. In making observations, points on the clouds are selected by telephonic communication, and, when practicable, from three to five observations are taken on the same point, at intervals of a minute. Three or more points are selected successively on the same kind of clouds, in different parts of the sky, in order to avoid the error which may arise from the observers at the same moment following different clouds or different portions of the same cloud, and also in order to obtain a better knowledge of the mean height of the same cloud stratum.

The observations are reduced by the simple trigonometrical formulæ. All poor observations are discarded, as well as those made when the cloud was near the horizon or near the base line.

The theodolite measurements at two stations are supplemented by four other methods, devised by Mr. Clayton, to determine the height of the lower clouds; these are:

1. Measurements at one station of the positions of the cloud, sun, and cloud shadow from which the height can be calculated.

2. Sending up kites and measuring the amount of line and the angle of the kite above the horizon when it enters the base of the cloud.

3. Measuring from Blue Hill, the angular altitude of light reflected at night on clouds above cities whose distances are known.

4. Noting the height of the base of low clouds on the side of Blue Hill.

The first two methods are used frequently, the last two only

occasionally. The necessity of these additional methods is proved by the fact that the average height of nimbus and strato-cumulus from theodolite measurements alone is considerably more than 1,000 meters, while measurements with kites show that on more than half of the days on which these clouds are present their bases are below 1,000 meters and usually below 500 meters. The reason is that low clouds are so indefinite in form, or cover the sky with such a uniform veil, that it is impossible to measure them with theodolites or photogrammeters.

EXCESSIVE PRECIPITATION IN THE UNITED STATES.

By ALFRED J. HENRY, Chief of Division.

Vast sums of money are expended each year in the construction of sewers and drainage systems. In the designing of main sewers for large areas a thorough knowledge of the vicissitudes of rainfall of the region, particularly as regards the intensity and duration of the heavier falls, is essential.

A number of quite heavy rainstorms occurred during the past year, and in a number of cases the capacity of the sewers was not equal to the task of discharging the accumulated storm waters. Failure of sewers to carry off flood waters is not a new problem in municipal engineering, though it has cost in damage to property and resulting litigation many thousands of dollars.

At the request of a number of civil and municipal engineers, Prof. Willis L. Moore, Chief of Bureau, has directed that statistics of unusually heavy rains be published in greater detail than heretofore. The facts and figures herein presented may be considered as a first attempt to draw some useful deductions from the records of automatic rain gauges in use at Weather Bureau stations.

Excessive rains naturally fall into two broad classes, (*a*) rains of great intensity and short duration, and (*b*) light intensity and long duration. Of these two classes, those of the first are by far the most damaging and destructive. In extreme cases 95 per cent of the downpour may quickly find its way into natural or artificial drainage channels. A rainfall of one-half inch in linear depth represents about 11,312 imperial gallons per acre. Assuming that in extreme cases only 5 per cent is absorbed, it is easily seen how great a quantity of water must flow into the drainage channels.

On the Pacific Coast, particularly the coast of Washington and Oregon, where the annual rainfall is greater than in any other portion of the United States, excessive rains of class *a* are not prevalent. The rain of this region falls principally between September and May, the colder part of the year, when convectional overturning in the atmosphere is least active.

The most favorable conditions for the sudden condensation of a vast quantity of water vapor are conceived to be (1) a strong vertical temperature gradient; (2) high surface temperature and humidity, in fact, the general conditions of humidity and instability of the atmosphere necessary to the formation of thunderstorms and tornadoes.

The most violent rains of class *a*, and, at the same time, those of which the least is known, are the so-called cloudbursts of the mountainous and arid regions of the west. These storms are not confined to any particular state or region but may occur in mountainous localities throughout the entire territory bounded by the British possessions on the north, the Mexican border on the south, the foothills of the Rockies on the east and the Sierras on the west. In the true cloudburst the rain seems to pour down rather than fall in drops, and, as a rule, the downpour of water covers an extremely small area. It often happens that the downpour occurs over rather narrow basins or on mountain slopes whose outlets are canyons or gorges leading to a valley or plain below. In these cases almost the entire amount of water quickly finds its way into the drainage channel, and, as a result, a wave of water rushes down the outlet with considerable velocity and in sufficient volume to destroy everything in its path. Such a flood wave almost swept away the town of Eureka, Nev., in 1874, and caused the loss of 15 lives. A far greater disaster occurred in Bear Creek Canyon, Colo., in July, 1896. Thirty lives were lost and property valued at more than $100,000 was destroyed.

The amount of rain that falls in one of these torrential downpours has never been ascertained. A cloudburst passed over the edge of the little town of Palmetto, Nev., in August, 1890. A rain gauge that was not exposed to the full intensity of the storm caught 8.80 inches of water in an hour. In August, 1891, two storms passed over Campo, Cal., within a few minutes of each other. The second storm was a veritable cloudburst. The observer succeeded in measuring the rainfall of the first shower and a portion of the second. Eleven and a half inches were measured within an hour. The rain gauge and support were carried away by the torrent of water in the second storm and the full record was not obtained.

The great majority of excessive rains (class *a*) in the United States occur east of the one hundred and fifth meridian, and principally in the summer months. They are most frequent in connection with summer afternoon thunderstorms, but occasionally occur in the track of West India hurricanes. They are more abundant on the Gulf and south Atlantic coasts than at inland points.

In Table A there are given the essential facts concerning each excessive rain of which permanent record was made during 1896, at stations equipped with self-recording rain gauges. Columns 1 and 2 give the total duration of the storm; column 3, the total depth of rainfall; columns 4 and 5, the beginning and ending, respectively, of the excessive rate; column 6, the amount of rain that fell before the excessive rate began. In the succeeding colums the accumulated amounts of rainfall are given for each successive five minutes of the storm's duration up to fifty minutes, and in ten and twenty minute periods thereafter.

It is possible to determine from the details thus presented whether or not rain falls at a uniform rate and how long such rate continues, and also the approximate time when the flow in the sewers shall be at a maximum for any given rate.

It is generally assumed that in heavy showers the intensity, i, varies inversely as the duration, t, and a number of formulæ have been suggested to express the relation between i and t. From an examination of the data in Table A, it would seem to be extremely doubtful whether a relation sufficiently definite to admit of expression by mathematical formulæ exists. The general principle that rains of the highest intensity exhaust themselves quickly holds good, but the fact remains that the total duration of the storm bears no simple relation either to the rate or linear depth of rainfall.

Percentage of cases in which the maximum intensity of rainfall occurred within five to sixty minutes from the beginning of the storm.

Maximum intensity occurred.	Washington.	Savannah.	St. Louis.
	Per cent.	*Per cent.*	*Per cent.*
Within 5 minutes from beginning of storm....	17	10	32
" 10	21	20	30
" 15	20	21	8
" 20	5	13	5
" 25	8	7	2
" 30	9	10	2
" 35	5	5	2
" 40	5	1	8
" 45	2	4	5
" 50	1	5	5
" 60	6	3	2

The periods of very great intensity are of short duration and may occur at any time during the continuance of the storm. There may be two and even three periods of great intensity in a single storm separated by intervals of light

rain. The table above shows the time of occurrence of the maximum intensity, counting from the beginning of the storm, of all storms that occurred at Washington, D. C., during the period 1881–1896, and at Savannah, Ga., and St. Louis, Mo., 1889–1896.

In Table A, which follows, the amounts given in column 6 are always included in those of column 3. Whenever possible the full record of the storm before the beginning of the excessive rate, but not after, has been given in the columns under "Depths of precipitation, etc."

TABLE A.—*Showing the accumulated amounts of precipitation for each five minutes during all storms of* 1896 *in which the rate equaled or exceeded* 1.00 *inch per hour, at all stations of the Weather Bureau furnished with self-registering gauges.*

Station and date.	Total duration.		Total amount of precipitation.	Excessive rate.		Amount before excessive rate began.	Depths of precipitation (in inches) during periods of time as indicated.												
	From—	To—		Began—	Ended—		5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
Baltimore, Md.	1	2	3	4	5	6														
July 21, 1896	9.15 p.m.	11.58 p.m.	2.05	9.30 p.m.	10.40 p.m.	0.05	0.21	0.35	0.46	0.58	0.62	0.64	0.67	0.70	0.83	0.95	1.18	1.77	.....	.....
September 19, 1896	4.55 p.m.	5.40 p.m.	1.00	5.15 p.m.	5.40 p.m.	0.05	0.25	0.60	0.85	0.92	0.95	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chicago, Ill.																				
May 25, 1896	1.37 a.m.	3.50 a.m.	1.46	3.08 a.m.	3.25 a.m.	0.09	0.01	0.09	0.52	1.07	1.26	1.29	1.31	1.32	.....	.....	.....	.....	.....	.....
August 6, 1896	6.05 a.m.	7.35 a.m.	1.18	6.05 a.m.	6.45 a.m.	0.00	0.10	0.30	0.36	0.62	0.90	0.99	1.04	1.17	.....	.....	.....	.....	.....	.....
Cincinnati, Ohio.																				
July 20–21, 1896	9.45 p.m.	12.20 a.m.	1.93	9.48 p.m.	10.27 p.m.	0.02	0.14	0.30	0.42	0.55	0.82	1.00	1.05	1.12	1.16	1.19	1.23	.....	.....	.....
Cleveland, Ohio.																				
April 30, 1896	3.25 p.m.	5.00 p.m.	1.64	3.27 p.m.	4.00 p.m.	0.05	0.28	0.58	0.88	1.13	1.23	1.38	1.49	1.53	.....	.....	.....	.....	.....	.....
June 8, 1896	11.00 a.m.	12.55 p.m.	1.87	11.12 a.m.	11.47 a.m.	0.04	0.04	0.19	0.49	0.79*	1.04*	1.31*	1.58	1.68	1.73	1.76	.....	.....	.....	.....
Denver, Colo.																				
July 25, 1896	3.52 p.m.	4.22 p.m.	1.02	3.57 p.m.	4.22 p.m.	0.05	0.05	0.30	0.60	0.78	0.95	1.02	.....	.....	.....	.....	.....	.....	.....	.....
Detroit, Mich.																				
June 25, 1896	5.50 p.m.	6.40 p.m.	1.19	5.58 p.m.	6.28 p.m.	0.05	0.15	0.45	0.85	1.00	1.07	1.14	.....	.....	.....	.....	.....	.....	.....	.....
July 26–27, 1896	8.15 p.m.	5.00 a.m.	2.62	8.17 p.m.	8.58 p.m.	0.02	0.38	0.57	0.63	0.91	1.13	1.30	1.43	1.63	1.70	1.73	1.78	.....	.....	.....
Dodge City, Kans.																				
April 16, 1896	4.45 p.m.	5.46 p.m.	1.36	5.05 p.m.	5.40 p.m.	0.05	0.05	0.15	0.40	0.65	0.80	0.97	1.12	1.20	1.25	.....	.....	.....	.....	.....
July 18, 1896	1.45 a.m.	2.35 a.m.	1.18	1.45 a.m.	2.15 a.m.	0.00	0.19	0.35	0.59	0.78	0.91	1.00	1.06	1.11	.....	.....	.....	.....	.....	.....
Galveston, Tex.																				
March 15, 1896	8.00 a.m.	6.00 p.m.	2.17	11.20 a.m.	11.47 a.m.	0.35	0.10	0.30	0.37	0.47	0.62	0.75	0.82	0.85	0.88	0.90	1.00	1.12	1.18	1.22
July 11, 1896	12 noon	3.30 p.m.	1.67	2.07 p.m.	2.52 p.m.	0.32	0.30	0.45	0.57	0.65	0.77	0.90	0.98	1.04	1.10	1.13	1.23	.....	.....	.....
Indianapolis, Ind.																				
May 25, 1896	5.40 a.m.	6.05 a.m.	1.01	5.40 a.m.	6.05 a.m.	0.00	0.30	0.50	0.90	0.93	1.01	.....	.....	.....	.....	.....	.....	.....	.....	.....
September 18, 1896	10.20 p.m.	11.40 p.m.	1.78	10.25 p.m.	11.10 p.m.	0.05	0.05	0.20	0.42	0.55	0.80	1.00	1.30	1.50	1.65	1.73	1.78	.....	.....	.....
Jacksonville, Fla.																				
March 11, 1896	6.20 a.m.	10.15 a.m.	1.20	8.38 a.m.	9.07 a.m.	0.10	0.14	0.20	0.35	0.85	0.90	1.01	.....	.....	.....	.....	.....	.....	.....	.....
June 4, 1896	2.35 p.m.	4.55 p.m.	2.49	2.58 p.m.	3.50 p.m.	0.12	0.07	0.14	0.47	0.92	1.30	1.57	1.58	1.60	1.71	1.79	1.99	2.19	2.34	.....
June 19, 1896	3.05 p.m.	5.40 p.m.	1.35	3.05 p.m.	3.55 p.m.	0.00	0.30	0.61	0.70	0.77	0.82	0.85	0.87	0.89	1.00	1.15	.....	.....	.....	.....
August 4, 1896	1.20 p.m.	2.20 p.m.	1.21	1.30 p.m.	2.02 p.m.	0.05	0.04	0.26	0.44	0.69	0.81	0.91	1.04	1.12	1.15	1.18	.....	.....	.....	.....
August 26, 1896	3.04 p.m.	6.15 p.m.	2.09	3.17 p.m.	4.00 p.m.	0.15*	0.05*	0.11*	0.20*	0.34*	0.50	0.85	1.07	1.30	1.50	1.65	1.80	.....	.....	.....
Jupiter, Fla.																				
January 25, 1896	5.25 p.m.	10.30 p.m.	2.18	6.40 p.m.	7.21 p.m.	0.35	0.03	0.06	0.10	0.16	0.30	0.43	0.51	0.66	1.06	1.36	1.56	.....	.....	.....
July 13, 1896	4.00 p.m.	10.30 p.m.	2.17	8.00 p.m.	8.40 p.m.	0.97	0.10	0.35	0.55	0.59	0.67	0.75	0.90	1.10	.....	.....	.....	.....	.....	.....
September 9, 1896	10.30 p.m.	12 noon	1.35	10.30 a.m.	11.12 a.m.	0.00	0.07	0.24	0.51	0.73	0.88	0.96	1.01	1.10	1.14	1.17	.....	.....	.....	.....
Kansas City, Mo.																				
May 31, 1896	5.55 a.m.	7.25 a.m.	1.17	6.28 a.m.	6.38 a.m.	0.10	0.80	1.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
July 18–19, 1896	3.30 p.m.	7.20 p.m.	5.54	3.50 p.m.	5.05 p.m.	0.10	0.05	0.15	0.40	0.65	1.00	1.30	1.52*	1.73*	1.87*	1.99*	2.22*	2.57*	.....	.....
Key West, Fla.																				
November, 7, 1896	2.20 p.m.	4.10 p.m.	1.00	2.56 p.m.	3.41 p.m.	0.14	0.05	0.10	0.22	0.32	0.34	0.35	0.45	0.65	0.82	0.86	.....	.....	.....	.....
Little Rock, Ark.																				
June 2, 1896	10.25 a.m.	11.35 a.m.	1.11	10.43 a.m.	11.03 a.m.	0.05	0.25	0.50	0.75	0.95	0.99	1.02	1.05	.....	.....	.....	.....	.....	.....	.....
October, 29, 1896	8.20 a.m.	11.45 a.m.	1.75	10.29 a.m.	10.54 a.m.	0.79	0.06	0.33	0.46	0.60	0.66	0.70	0.73	0.76	0.79	0.82	0.91	.....	.....	.....
Louisville, Ky.																				
June 23, 1896	4.17 p.m.	4.53 p.m.	1.37	4.30 p.m.	4.46 p.m.	0.05	0.20	0.65	1.20	1.30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
July 4, 1896	5.52 p.m.	9.35 p.m.	4.60	6.08 p.m.	7.40 p.m.	0.15	0.06	0.15	0.70	1.20	1.52	1.70	1.90*	2.06*	2.22*	2.38*	2.70*	3.43*	4.15*	*4.35
Nantucket, Mass.																				
July 6, 1896	8.05 p.m.	10.25 p.m.	1.41	9.23 p.m.	10.23 p.m.	0.25	0.12	0.24	0.37	0.42	0.46	0.49	0.55	0.60	0.64	0.95	1.15	.....	.....	.....
Nashville, Tenn.																				
May 31, 1896	1.15 p.m.	2.25 p.m.	1.24	1.46 p.m.	2.20 p.m.	0.15	0.05	0.08	0.20	0.31	0.40	0.64	0.79	0.90	1.12	1.22	.....	.....	.....	.....
July 2, 1896	3.37 p.m.	6.13 p.m.	1.32	4.52 p.m.	5.46 p.m.	0.10	0.05	0.19	0.44	0.60	0.72	0.76	0.78	0.80	0.85	0.97	1.21	.....	.....	.....
July 12, 1896	3.58 p.m.	5.15 p.m.	1.50	3.58 p.m.	4.26 p.m.	0.00	0.12	0.30	0.60	0.82	1.05	1.11	1.12	1.13	1.14	1.15	1.20	1.50	.....	.....
New Orleans, La.																				
March 10, 1896	2.30 p.m.	9.20 p.m.	1.81	6.27 p.m.	7.08 p.m.	0.30	0.06	0.15	0.25	0.30	0.35	0.40	0.48	0.65	0.95	1.05	1.09	.....	.....	.....
March 18, 1896	1.10 p.m.	6.30 p.m.	2.32	2.11 p.m.	3.00 p.m.	0.25	0.11	0.16	0.30	0.65	0.92	1.05	1.22	1.35	1.44	1.50	1.55	.....	.....	.....
April 9, 1896	1.20 p.m.	2.20 p.m.	1.57	1.20 p.m.	1.50 p.m.	0.00	0.15	0.40	0.72	1.12	1.45	1.51	1.55	.....	.....	.....	.....	.....	.....	.....
April 14, 1896	1.30 p.m.	7.40 p.m.	1.52	3.45 p.m.	4.31 p.m.	0.15	0.04	0.21	0.44	0.60	0.64	0.67	0.79	0.96	0.99	1.07	1.11	.....	.....	.....
September 2, 1896	8.25 a.m.	2.15 p.m.	3.33	9.45 a.m.	10.40 a.m.	0.65	0.04	0.09	0.15	0.24	0.34	0.46	0.62	0.92	1.22	1.44	1.67	.....	.....	.....
New York, N. Y.																				
July 6, 1896	12.32 p.m.	1.30 p.m.	1.06	12.32 p.m.	1.10 p.m.	0.00	0.20	0.42	0.60	0.83	0.89	0.94	0.99	1.01	.....	.....	.....	.....	.....	.....
Norfolk, Va.																				
June 9, 1896	2.47 p.m.	3.50 p.m.	1.45	2.47 p.m.	3.28 p.m.	0.00	0.25	0.40	0.55	1.00	1.17	1.26	1.35	1.44	.....	.....	.....	.....	.....	.....
June 22, 1896	5.13 p.m.	6.40 p.m.	1.32	5.13 p.m.	5.40 p.m.	0.00	0.10	0.37	0.66	1.00	1.06	1.10	.....	.....	.....	.....	.....	.....	.....	.....
July 16, 1896	7.25 p.m.	8.35 p.m.	1.04	7.30 p.m.	8.00 p.m.	0.05	0.05	0.33	0.58	0.80	0.87	0.95	1.01	.....	.....	.....	.....	.....	.....	.....
Omaha, Nebr.																				
August 15, 1896	6.30 p.m.	7.54 p.m.	1.68	6.37 p.m.	7.00 p.m.	0.05	0.35	0.70	1.10	1.45	1.62	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburg, Pa.																				
August 13, 1896	7.50 a.m.	11.40 a.m.	2.22	8.33 a.m.	9.31 a.m.	0.10	0.07	0.25	0.50	0.85	1.05	1.13	1.21	1.29	1.37	1.44	1.70	.....	.....	.....
Portland, Me.																				
September 6, 1896	3.15 a.m.	5.00 p.m.	5.21	7.30 a.m.	8.20 a.m.	1.93	0.12*	0.24*	0.36*	0.48*	0.58	0.80	0.98	1.13	1.26	1.53	1.58	1.73	1.84	1.97
St. Louis, Mo.																				
May 27, 1896	5.43 p.m.	.....	2.89	6.04 p.m.	7.00 p.m.	0.01	0.08	0.17	0.33	0.49	0.72	0.85	0.93	0.99	1.05	1.23	1.33			
	.....	10.05 p.m.		7.23 p.m.	7.35 p.m.	0.12	0.23	0.66	0.70	0.70	0.70	0.71	0.71	0.71	0.76	0.83	1.01	1.16	1.35	1.43
St. Paul, Minn.																				
August 4, 1896	12.08 a.m.	12.38 a.m.	1.58	12.08 a.m.	12.38 a.m.	0.00	0.10	0.46	0.84	1.24	1.44	1.58	.....	.....	.....	.....	.....	.....	.....	.....
August 9, 1896	4.15 p.m.	5.10 p.m.	1.07	4.15 p.m.	4.55 p.m.	0.00	0.06	0.19	0.39	0.59	0.61	0.68	0.85	1.00	1.07	.....	.....	.....	.....	.....
Savannah, Ga.																				
April 24, 1896	5.30 p.m.	8.45 p.m.	1.30	7.06 p.m.	7.27 p.m.	0.20	0.05	0.10	0.13	0.15	0.20	0.45	0.67	0.80	0.87	0.93	1.02	1.10	1.25	.....
July 7, 1896	9.45 a.m.	11.10 a.m.	1.34	9.55 a.m.	10.13 a.m.	0.05	0.02	0.05	0.30	0.65	0.90	1.05	1.10	1.11	1.12	1.13	1.15	1.30	.....	.....
August 18, 1896	5.45 p.m.	10.45 p.m.	2.68	8.33 p.m.	8.56 p.m.	1.40†	0.25	0.50	0.70	0.95	1.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
August 26, 1896	4.30 a.m.	5.35 a.m.	1.63	4.42 a.m.	5.19 a.m.	0.10	0.05	0.08	0.15	0.27	0.38	0.62	0.97	1.25	1.45	1.57	1.63	.....	.....	.....
Vicksburg, Miss																				
April 13, 1896	1.30 p.m.	7.15 p.m.	1.63	1.36 p.m.	2.20 p.m.	0.05	0.04	0.16	0.36	0.60	0.66	0.78	0.84	0.90	0.96	1.02	1.07	.....	.....	.....
June 6, 1896	3.25 p.m.	9.55 p.m.	1.60	3.34 p.m.	3.57 p.m.	0.05	0.03	0.08	0.35	0.60	0.80	1.00	1.06	1.08*	1.10*	1.14*	1.18*	1.26*	1.34*	.....
October 22–23, 1896	9.45 p.m.	8.15 a.m.	1.38	5.31 a.m.	5.46 a.m.	0.55	0.19	0.45	0.61	0.65	0.68	0.72	0.76	.....	.....	.....	.....	.....	.....	.....
Washington, D. C.																				
August 13, 1896	5.20 p.m.	8.24 p.m.	1.73	6.20 p.m.	7.00 p.m.	0.05	0.14	0.33	0.75	0.95	1.15	1.34	1.45	1.52	1.57	.....	.....	.....	.....	.....
Wilmington, N. C.																				
August 3, 1896	1.25 p.m.	3.45 p.m.	1.19	1.58 p.m.	2.20 p.m.	0.05	0.10	0.50	0.75	0.90	1.06	1.07	1.08	1.09	.....	.....	.....	.....	.....	.....

*Partly estimated. †Fell in three short heavy showers of about equal amounts, at intervals of nearly 1 hour.

If we select from the whole number of individual storms those shorter periods during which a very high rate was maintained, and plot the rates per hour as abscissæ in a system of rectilinear coordinates we obtain, after connecting the points so plotted, a curve of probable maximum intensity.

Thus we find that at Washington during the last 16 years the highest rate per hour for any

5	consecutive	minutes	was	7.50	inches, September	3, 1882.
10	"	"	"	5.10	" "	16, 1888.
15	"	"	"	4.50	" June	27, 1881.
20	"	"	"	3.90	" "	27, 1881.
25	"	"	"	3.60	" "	27, 1881.
30	"	"	"	3.15	" "	27, 1880.
40	"	"	"	2.75	" "	10, 1876.
50	"	"	"	2.30	" "	10, 1876.
60	"	"	"	1.98	" "	10, 1876.
120	"	"	"	1.23	" July	26, 1886.

Chart VII shows the curves of probable maximum intensity for Washington, *a*, and Savannah, *b*, constructed in the manner indicated. It is proper to add that Mr. J. de Bruyn Kops, Assistant Engineer, Savannah, Ga., independently formed a similar curve for that city during the summer of 1896. The full line curve has been reproduced from Ex. Doc. No. 445, 51st Congress, 1st Session—Report upon the Sewerage of the District of Columbia, Washington, D. C., 1890.

The combined records of excessive rainfall in the cities of Boston, Providence, New York, Philadelphia, and Washington, representing observations for an aggregate of about 70 years, were used in constructing the last-named curve..

The conclusion to be drawn from the similarity of the curves is that, in general, the highest intensity of any individual storm will not greatly exceed the limits marked by the separate curves. It must be remembered that the curves are in a sense composite, being made up of fragments from the storms of greatest intensity and do not, therefore, represent a continuous storm of the intensity shown.

MEMORABLE SNOWSTORMS IN SOUTH DAKOTA.

By S. W. GLENN, Local Forecast Official, Huron, S. Dak. (dated February 20, 1897).

Photographs showing the remarkable snow drifts in the city of Huron, S. Dak., having been received by the Chief of the Weather Bureau from Mr. Glenn, he was requested to make a report on this subject and the Editor has the pleasure of submitting the following as received from Mr. Glenn:

The meteorological features at Huron, S. Dak., during January, 1897, were remarkable because more precipitation occurred by far than during any other January since the station was established (July 1, 1881), and also because one of the steadiest and most persistent periods of very low temperature that ever visited the station (though not the most extreme) prevailed during the third decade. The total precipitation during the month was 2.87 inches, an excess over the normal of 2.38 inches. The total depth of snowfall was 26.7 inches. During the winter of 1880–81 there was very heavy snowfall and old residents state that at the end of February the average depth of snow in the vicinity of Huron was 3 to 4 feet, but the January snowfall was not as heavy as that of the current January.

Storms of more or less severity, commonly known as blizzards, occurred on the 1st, 2d, 3d, 4th, 16–17th, and 23d–24th.

From the 23d to 29th, inclusive, the daily mean temperature ranged from 4° to 22° below zero, with steady fresh to brisk and high northwest winds, until afternoon of 29th, when the wind veered to southeast and the weather began to moderate.

The most noteworthy storms occurred on the 2d to 4th and 16–17th. A dry snow began at 10.20 p. m. of the 2d and continued until about 4 a. m. of the 3d; beginning again at 9.10 a. m. of 3d, it continued until 10.20 p. m, of the 4th. By 8 p. m. of the 3d 5 inches of snow had fallen and by 8 p. m. of the 4th an additional 10.5 inches. On the 3d the wind movement averaged 32 miles per hour; on the 4th, 40 miles per hour, with a maximum velocity on both days of 50 miles, from the northwest. During the 3d, in the daytime, the air was at times so full of fine, dry snow that objects, such as buildings, 50 feet away, were distinguishable only by outline. In the late afternoon and at night the air was at times literally full of flour-like snow as dense as fog and it was dangerous for persons to be out, especially in the more sparsely built up portion of the city, as the swirling snow was blinding and bewildering. There were several instances at night of persons losing their way for a time in the residence portion. During the night of the 3d the air was highly charged with electricity and contact with stoves or other metal produced a spark and quite a shock. For a time the tips of three twigs were illuminated by bright sparks and it is authentically stated that in some instances trees (box alder variety) appeared as though illuminated by numerous tiny electric lights.

This storm continued on the 4th without abatement until 3 p. m., when there were signs of its force breaking. The snow ended at 10.20 p. m., making, practically, a storm of forty-eight hours' duration. The snow drifted heavily and by the evening of the 4th there were drifts in the principal streets from 4 to 16 feet deep. Local business was almost entirely suspended, railroad and other traffic abandoned and complete train movement impossible for several days after. In some cases business houses could not be entered until a passage way was cut through the snowdrifts. Over the residence district, barns, sheds and other outbuildings were more or less, and in some cases entirely, covered.

The snow was so very fine and dry that it penetrated buildings through the slightest openings, more so than in any other storm in the history of the town. In the country there was some loss of live stock, principally sheep, by sheds caving in with the weight of the snow, and the snow drifting into the buildings and smothering the stock. The storm of the 16–17th was not so marked in point of precipitation, nor was the wind force so great. The average wind movement on the 16th was 15 and on the 17th 26 miles per hour, with a maximum velocity of 46 and 47 miles, from north and northwest. Snow began at 10.30 a. m. of the 16th, and the storm gradually increased. By 4 p. m. it was severe and augmenting, becoming very heavy in the night, with much fine, dry snow and a steady gale from the northwest. All trains on the railways were abandoned and business generally suspended. The drifts of snow were greatly augmented and only one side (east) of the principal business street was available for team service. The snow ended after midnight of the 16th, but began again at 9.50 a. m. of the 17th and ended at 3.30 p. m About 6 inches of snow fell during this storm, and although in general respects it was similar to the first storm there was no electricity in the air and the snow was not quite so dense and penetrating. It demonstrated to the railway companies that regular train service in the State for the remainder of the winter would be very doubtful, as the cuts through the drifts made by plows after the preceding storm were literally filled and the snow as tightly packed as originally, and that they were liable to be filled by every high wind moving the loose snow on the ground.

These storms have been compared by many with the memorable blizzard of January 12, 1888, during which so many fatalities occurred. While the storm of the 2d–4th was severe in point of snow and duration, it could not be compared with the one of 1888, which was accompanied by rapidly falling temperature and occurred so suddenly that those away from home in the country had no opportunity to seek shelter, even the nearest, comparatively, and the air was at once filled with fine, dry and blinding snow, with a severe gale. The storm of 2d–4th began on Saturday night and Sunday, when most farmers were at home, and increased so gradually that those away from shelter had ample time to protect themselves. The one in 1888 was preceded by unusually mild conditions, which tempted farmers long distances to water stock and procure fuel and other necessaries, after having been confined closely to home by preceding severe weather. The following is an extract from the Daily Journal of the Weather Bureau station at Huron, S. Dak., for January 12, 1888, showing how suddenly the storm broke, the markedly sudden and rapid increase in wind force, and the sudden and rapid fall in temperature:

"The southerly gale of yesterday and last night continued, with light snow, until 6 a. m., when the gale began to abate; at 12 noon its velocity was 24 miles per hour; between 12.35 and 12.40 p. m. it had subsided to 12 miles per hour, with a light snow and a damp atmosphere, the sky being obscured in patches by nimbus clouds; at 12.42 p. m. the air was perfectly calm for about one minute; the next minute the sky was completely overcast by heavy black clouds, which for a few minutes previously had hung along the western and northwestern horizon, and the wind veered to the northwest and blew with such force as to render the position of the observer on the roof unsafe. The air was immediately filled with snow as fine as sifted flour. The wind veered to the northeast, then backed to the northwest in a gale, which in three minutes attained a velocity of 40 miles an hour. These conditions continued steadily all day and until 4 a. m. of the 13th, when the gale began to abate, and the snow soon after ceased. At noon of the 12th the temperature was 20° and at 10 p. m. —17°, and fell to —28° during the night. The wind averaged from 45 to 50 miles and attained an extreme velocity of 60 miles per hour. The number of lives lost in this (Beadle) county was 11, and a considerable number injured."

Although the 1888 storm is probably better remembered by the people of the State and country, because of the great number of fatalities in the Northwest, it is likely that the one of April 13 to 16, 1873, was one of the most severe that ever occurred in South Dakota. It is generally known as the "Custer Blizzard," because General Custer, United States Army, was encamped at that time at Yankton, S. Dak. Gen. A. W. Greely, in his volume, American Weather, says of this storm: "The wind blew at Yankton, S. Dak., from 13th to 16th, inclusive, for

a continuous period of nearly one hundred hours, at an average velocity of 39 miles per hour, and on April 15 the velocity for the entire twenty-four hours was over 52 miles per hour. This hurricane-like wind was accompanied by fine drifting snow, which was like sand, and so filled the air that one could not see a dozen yards. The Seventh Regiment, United States Cavalry, was encamped at Yankton at the time, and for more than forty-eight hours officers and men alike were obliged to seek shelter in the houses of the citizens."

The atmospheric conditions attending the storm of January 12, 1888, are thus described in the Weather Bureau MONTHLY WEATHER REVIEW for that month: "On the morning chart of the 12th an area of high pressure appeared north of Montana. On this chart was also shown a well-defined area of low pressure central near Cheyenne, Wyo., the subsequent course of which was to the southeast till central near Concordia, Kans., at 3 p. m., then rapidly to the northeast. At 10 p. m. of the 12th the area of high pressure had extended to the southeast over Montana, Dakota, and Nebraska, while the pressure at its center had increased to 30.60 inches, the center of the area of low pressure before mentioned being located at La Crosse, Wis., and bounded by an isobar of 29.60 inches, there being a difference of pressure of 1.3 between the centers of the two areas, separated by about 1,200 miles. This marked difference in pressure caused winds of from 30 to 50 miles an hour, accompanied at some stations in Montana, Dakota, and Nebraska, by snow, which, with a fall of from 30° to 60° in temperature during the twenty-four hours preceding the 10 p. m. observation of the 12th, helped to make a violent storm in which many lives were lost and large numbers of cattle perished."

There is much similarity in the movement of the storm center in this and the storm of January 2–4, 1897. The latter did not move nearly so fast, to which can be attributed the length of the storm and the great amount of precipitation. On the morning of the 2d an area of low pressure, with a tendency to move northeast, was central near Little Rock, Ark., by the morning of the 3d it was central over Iowa, and on the morning of the 4th was over the Great Lakes, while persistently high pressure to the west and northwest of it, with a barometric gradient of from 0.90 to 1.00 inch, was present all of the time.

On the morning of the 2d a fall of from 20° to 30° in temperature had occurred over portions of the Dakotas, Nebraska, Iowa, and Minnesota, and it was still colder and temperature near zero at Huron on the morning of the 3d. It was but natural that the area of low pressure, beating its way northeast against this cold current, and high pressure north and west of it, should lose much more than the usual amount of the moisture. On its north and west sides that it was drawing from southern latitudes, in its slow progress toward the Lakes, falling in the form of snow over eastern South Dakota, which country was in unusually favorable position in relation to the formation and progress of the low area to receive the excess of its precipitation.

NOTES BY THE EDITOR.

THE EARLY HISTORY OF THE THERMOMETER AND BAROMETER.

In the Annual Report of the Chief Signal Officer for 1887 will be found a "Treatise on Meteorological Apparatus and Methods," which is usually bound up separately as Part II of the Report, and in which the Editor has brought together some information with regard to the history and development of various apparatus. Since then important contributions to this subject have been made by Gerland, and more recently Dr. Hellmann has laid us under still further obligations by including in his reprints of meteorological classics a volume on the history of the barometer and thermometer. At a recent meeting of the German Meteorological Association, in Berlin, Dr. Hellmann made the following remarks with regard to this volume, which are quoted from the Berlin *Vossische Zeitung:*

It considers the history of meteorological instruments in that it publishes the correspondence of Torricelli with Ricci on the measurement of atmospheric pressure, and also the description of the thermometer and hygrometer given by the Academy del Cimento in Florence. Torricelli's letters are of the greatest importance in the study of the history of the barometer. They treat of the experiment with quicksilver made by Viviani in the year 1643 in Florence at the suggestion of Torricelli, and are the only proof of this discovery, since Torricelli himself never published any other account. They are dated June 11 and 28, 1644, and show that Torricelli already knew at that time that the mercury in the tube changes its height because the air is sometimes heavier and denser, sometimes lighter and rarer. They also show that he made the experiment with a view to obtaining an instrument with which to observe the atmospheric changes. The news of Torricelli's experiment reached France through a letter from Ricci as early as 1644, but it was only in the summer of 1646 that the experiment was successfully accomplished, apparently because they could not earlier obtain the glass tubes needed to actually carry out the barometric test.

The report of the Academy del Cimento relates to the early history of the measurement of heat and moisture. It can not now be determined with absolute certainty who made the first attempt to measure the temperature, but it is probable that it was Galileo, who, stimulated by the Greek author, Heron, made a thermoscope at the end of the sixteenth or beginning of the seventeenth century. Possibly the physician, Santorio, in Padua, had, independently of Galileo, made thermoscopes that he applied first to practical medicine, as in the measurement of fever; also to scientific purposes, as in the measurement of the heat radiated from the moon. Santorio also was influenced by Heron's writings, so that in the invention of the thermometer we have presented to us the extremely rare case of the first beginnings of physical measurements being stimulated and expedited by the science of classical times. The first description and drawing of the new instrument was given by Biancani, who also first used the word "thermoscope" in the year 1620, whereas the word "thermometer" is found for the first time in a small book by the Jesuit Jean Leurichon, in the year 1624. There is little that is reliable that can be said as to the next following period in the history of the development of the thermometer. We only know that already, in 1632, the French physician, Jean Ray, instead of Galileo's air thermoscope, used water thermometers whose tubes were not, indeed, closed at the top, and that probably in 1641 the Duke Ferdinand II of Tuscany, first conceived the idea of closing the tube at the top so as to exclude the air, thus giving to the thermometer essentially the form in which it was afterwards known under the name of the "Florentine thermometer." Improvements in the instrument were made by the Academy del Cimento (that is to say the Academy of Experimentation which was founded in 1657 in Florence by Leopold, the brother of the reigning Grand Duke, and which, after 10 years' existence, was dissolved in consequence of the elevation of the Prince to the College of Cardinals). The most important results of the experimental work done by the Academy were recorded in a day book from which source the Secretary of the Academy, Lorenzo Magalotti, drew the material for his famous work *Saggi di naturali esperienze fatte nell' Academie del Cimento.*

[A complete English translation of this work was published by the Royal Society of London under the title of: Essays of Natural Experiments made in the Academy del Cimento, under the Protection of the Most Serene Prince Leopold of Tuscany. Written in Italian by the Secretary of that Academy. Englished by Richard Waller, Fellow of the Royal Society. London, I. T. Printed for Benjamin Alsop at the Angel and Bible in the Poultrey, over against the Church, 1684.]

The volume recently published by Dr. Hellmann reprints the first two chapters of the *Saggi*, as also drawings of three thermometers, namely, the so-called large, hundred-scale, the smaller, fifty-scale, and a very complicated spiral thermometer. The weakest point in the construction of these thermometers, which were very rapidly distributed throughout Europe, was the establishment of the scale, since the academicians knew only one fixed point, that of the melting point of snow, which occurred at about 13.5° on these thermometers. Nevertheless, in consequence of the excellent work of the glass blower, these instruments were very reliable and comparable among themselves.

A REPRINT OF EARLY METEOROLOGICAL CHARTS.

Among his recent "neudrücke," or reprints of classics in meteorology and terrestrial magnetism, Dr. Hellmann has published a volume illustrating the progress of meteorological chartography, in which he reprints (1) the first wind chart, which was prepared by Edward Halley in 1686, and which is also the oldest of all meteorological charts; (2) the first chart of isotherms, which Alexander von Humboldt published

in 1817; (3) a facsimile of one of the thirteen synoptic charts prepared by Elias Loomis in 1843, in connection with his investigation of two storms that occurred in 1842; (4) the weather chart, with isobars, that Le Verrier published in France on September 11, 1863, as the first daily weather chart on the basis of telegraphic reports; (5) the chart, with isobars, which is twelve years older than Le Verrier's, being that which was published daily for sometime in the year 1851, during the World's Fair at London; (6) a facsimile of the first chart of average isobars for any country, being that published for France in 1864 by Renou.

These reprints by Dr. Hellmann awaken one's interest in the history of the development of meteorology, and we can but hope that, in the abundance of his knowledge of ancient literature, he will discover some early American works that are worthy of being reprinted among his classics.

MEXICAN CLIMATOLOGICAL DATA.

In order to extend the isobars and isotherms southward so that the students of weather, climate and storms in the United States may properly appreciate the influence of the conditions that prevail over Mexico the Editor has translated the following tables from the current numbers of the *Boletin Mensual* as published by the Central Meteorological Observatory of Mexico. The data there given in metric measures have been converted into English measures. The barometric means are as given by mercurial barometers under the influence of local gravity, and therefore need reductions to standard gravity, depending upon both latitude and altitude; the influence of the latter is rather uncertain, but that of the former is well known. For the sake of conformity with the other data published in this REVIEW these corrections for local gravity have not been applied. One additional station, Topolobampo, is published at the end of Table II.

Mexican data for December, 1896.

Stations.	Altitude.	Mean barometer.	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
	Feet.	*Inch.*	° *F.*	° *F.*	° *F.*	%	*Inch.*		
Aguascalientes	6,112	23.86	65.1	33.4	59.4	36	0.00	n.	
Campeche									
Colima (Seminario)	1,600								
Colima					75.4				
Culiacan	112								
Guadalajara (O. d. E.)	5,141	25.03	77.0	29.8	57.6	86	0.00	nw.	w.
Guanajuato	6,761	23.73	73.8	37.2	55.6	48	T.	sw.	sw.
Jalapa	4,757	25.62	87.8	42.8	57.4	80	1.50	n.	
Lagos (L. G.)	6,275	24.19	77.5	25.5	54.0	63	0.00	ne.	ne.
Leon	5,901	24.35	74.8	27.7	54.5	51	0.00	ssw.	sw.
Magdalena (Sonora)			68.0	50.0	59.0		1.73	nne.	n.
Mazatlan	25	29.96	83.1	61.3	73.9	64	T.	nw.	sw.
Merida	50	30.04	89.8	55.4	71.6	76	2.09	ne.	sw.
Mexico (Obs. Cent.)	7,489	23.11	71.6	34.7	52.0	61	0.61	nw.	sw.
Mexico (E. N. de S.)	7,480								
Morelia (Seminario)	6,401	24.01	73.4	34.7	53.8	67	0.33	ne.	w.
Oaxaca	5,164	25.13	81.9	37.6	61.0	62	0.76	nw.	ne.
Pabellon	6,312								
Pachuca	7,956	22.56	73.0	33.8	50.5	64	0.00	nne.	ne.
Puebla (Col. d. Est)	7,118								
Puebla (Col. Cat.)	7,112	23.33	75.2	35.2	55.0	65	0.53	e.	ne.
Queretaro	6,070								
Saltillo (Col. S. Juan)	5,377								
San Luis Potosi	6,202	24.20	70.7	31.3	54.4	65	0.14	e.	w.
Silao	6,063	24.34	69.6	40.3	57.2	65	T.	w.	sw.
Tacámbaro									
Tacubaya (Obs. Nac.)	7,630								
Tampico (Hos. Mil.)	38								
Tehuacan	5,453								
Toluca	8,612	21.93	68.7	25.2	49.1	62	1.08		
Trejo (H.de, S., Gto.)*	6,011						0.00	e.	
Trinidad†	6,011								
Veracruz	48								
Zacatecas	8,015	22.56	74.8	24.8	52.0	52	0.00	ne.	ne.
Zapotlan (Seminario)	5,125								

*Trejo appears to have the same altitude as the next station, Trinidad, but this may be a typographical error in the December *Boletin*.
†Trinidad is 14 kilometers east-southeast of Leon.

ANNUAL MEANS FOR 1895.

The following table is taken from the general synopsis published in the *Boletin Mensual* for December, 1896, page 171, which is a summary of the annual tables published at occasional intervals in the *Boletin* during the past year. A corresponding synopsis for 1896 will, doubtless, also soon become available. These annual summaries are essential as a basis for the reduction of the pressure and temperature to sea level, which reduction must be carried out for normal and annual values before discussing monthly means or individual observations. The altitudes here given are taken from the respective annual tables from which this synopsis is quoted; unfortunately they differ sometimes from the altitudes given in the monthly tables for 1896, but we may not go far wrong in assuming that the barometers have remained in the same location during both these years and that the changes in the figures are simply the result of a revision of the adopted altitudes. Nothing is published as to the manner in which these altitudes have been determined, possibly many of them may be the result of barometric computations, in which case the reduced pressures will have a corresponding uncertainty. In accordance with the other Mexican data the barometric means have not been reduced to standard gravity and, in fact, the values of local gravities at the respective stations is, as yet, not known by actual observation but may be approximately computed by Mr. Putnam's formula, as given on page 463 of the MONTHLY WEATHER REVIEW for December, 1896.

Annual synopsis for 1895*; Mexican stations.*

Stations.	Altitude for 1895.	Barometer (mean).	Temperature.			Mean humidity.	Days with rain.	Total precipitation.	Wind, prevailing direction.	Clouds.	
			Mean annual.	Maximum (absolute).	Minimum (absolute).					Mean cloudiness.	Prevailing direction.
Guanajuato	*6,640	23.68	65.5	91.9 89.6	36.0	% 48	100	22.68	ssw.	% 40	ne.
Jalapa	4,757	25.55	63.5	91.6	33.8	82	147	51.20	nnw	....	.....
Leon	5,901	24.29	65.7	91.0	32.0	47	113	20.92	§	44	sw.
Mazatlan	25	29.92	76.8	103.6	56.8	77	75	42.85	nw.	34	sw.
Merida	50	29.95	78.4	84.9	47.8	71	97	29.29	ne.	47	se.
Mexico	*7,472	23.07	60.3	87.8	32.9	57	145	22.01	n.	50	ne.
Morelia	6,401	23.96	61.9	93.7	37.4	63	125	32.96	ssw.	49	w.
Oaxaca	5,164	25.11	69.4	80.2	39.2	61	109	28.08	w.	44	e.
Pachuca.‡	7,956	22.59	57.9	83.8	32.4	59	106	10.86	nne.	37	ne.
Puebla (C. d. E.)	7,118	23.35	60.6	91.4	32.9	60	113	23.55	ne.	45	n.
Puebla (Col. Cat.)	7,112	23.37	63.0	90.1	37.6	60	124	27.09	e.	37	se.
Queretaro	6,070	24.18	64.9	80.2	32.9	59	67	9.95	e.	....	.....
Real d. Monte†	9,095	21.59	55.4	89.6	31.6	....	93	24.45	.....	37	.....
Saltillo	5,377	24.85	63.7	89.2	51.8	72	77	23.46	ne.	32	n.
San Luis Potosi	6,202	24.14	63.9	90.4	26.1	59	64	11.25	e.	41	w.
Tacubaya	7,630	22.97	58.6	81.5	36.6	61	136	24.72	nw.	44	.....
Toluca	8,612	21.91	54.9	90.0	24.4	59	154	26.16	wsw	44	se.
Zacatecas	*8,189	22.54	60.1		19.0	55	64	10.70	sw.	36	se.

*These altitudes for 1895 differ from those published in the respective monthly summaries for 1896. In the absence of positive information it may be assumed that the barometers were not removed, but that the adopted altitudes have been revised from time to time.
†This station does not appear among the monthly summaries of 1896.
‡The monthly and annual barometric means are published to the nearest tenth of a millimeter, but for all other stations to the nearest hundredth.
§Sw. & wsw.

METEOROLOGY IN THE PUBLIC SCHOOLS.

In the MONTHLY WEATHER REVIEW for December, 1895, Vol. XXIII, page 458, the Editor has referred to the excellent results attained in school work by utilizing, as a basis for discussion and mental training, such elementary observations of the weather as can be made by any child. When the scholars in any class are encouraged to keep personal diaries and notes of atmospheric phenomena their perceptive faculties are rapidly developed; when these diaries are compared and the ideas that are suggested by the pupils are discussed under the leadership of a wise teacher, the analytical faculties of the mind are developed, the study of nature is encouraged, erroneous ideas are supplanted by careful generalizations, and experience comes to be esteemed more highly than inherited myths and legends. The highest development of this method of studying meteorology will undoubtedly be

found in those high schools and colleges that pursue the course of study laid out in Davis' Elementary Meteorology; but for the lower grades of public schools a teacher who has at hand the text-books by Waldo, Davis, Russell, or any other of the numerous recent authors, will prefer to mark out a course of observation and study that requires no text-book in the hands of the scholar, except his own daily record and the daily map of the Weather Bureau. In this case the scholar looks to the teacher entirely for his mental stimulus, the teaching is done entirely by personal observations and verbal discussions; the teacher, as it were, pries into the scholar's thoughts, finds out the errors that he is liable to make, and helps him to discover the truth for himself. He does not cram the scholar, but leads him to think for himself and find his own way out of the woods. This process is infinitely superior to the ordinary text-book method, but, of course, it implies very careful leadership on the part of the teacher.

To schools that adopt this method of teaching the circular that has just been sent out by a committee at Cambridge, Mass., will come as a welcome stimulus. The schools that can show the best work done, or the best record of work done in the study of weather and climate, will doubtless be proud to carry off the prize offered by the committee, whose circular reads as follows:

PRIZES FOR SCHOOL WORK ON WEATHER AND CLIMATE.

On the dissolution of the New England Meteorological Society, in 1896, a sum of about $100 was left in the hands of the undersigned committee to be used "for some meteorological purpose." In order to carry out the wishes of the society the committee offers three annual prizes of $12, $10, and $8 for the best work on weather and climate in any New England public school below the high school, according to conditions stated below. The prizes will be awarded to the school, not to the scholars. It is hoped that the fund will be enlarged by subscription, so that the prizes may be continued for a number of years.

The prizes will be awarded by judges to be selected at a later date. Each competing school may submit the work of three pupils selected by the teacher from the work of a single class.

All papers and record books sent are to be wholly the work of the pupils whose names they bear; all records are to be the result of the pupils' own observation; the papers received will be taken to represent the best products of work done by an entire class, that is, all members of the class are to do work similar to that of the three pupils whose papers are forwarded to the committee.

With the work of each pupil a paper should be sent stating (1) name of pupil; (2) age, in years and months; (3) name of school and grade or class (counting first year in school as first grade, second year, second grade, etc.); (4) name of teacher; (5) town or city, and State.

The committee does not desire to limit the work closely or to require uniformity. The work may be done as special study in weather and climate, or it may be part of a course in nature study or in geography. But the committee suggests the following topics as appropriate:

(1) Observation and record of simple weather elements.

(2) Preparation of weather maps based on data supplied by the teacher.

(3) The use of weather maps and of local observations in simple weather predictions.

(4) Special observation and study of the elements that control the climate of New England.

The judges will make due allowance for the age of pupils and their school grade, and will award the prizes on the basis of quality of work in whatever subject the teacher may choose, bearing directly on weather and climate. Owing to the late date at which this circular is issued, work covering only the second half of the school year, 1896–97, will be accepted in the first competition.

The papers submitted should be received in Cambridge by July 10, 1897. Address: Prof. W. M. Davis, Museum, Cambridge, Mass. Express charges or postage should be fully prepaid. If it is desired to have the papers returned full directions should be given for post office or express address; and if return by mail is desired, stamps for postage should be inclosed.

The committee will be glad to give further information, if desired.

W. H. NILES,
Professor of Geology and Geography in the Massachusetts Institute of Technology, and also at Wellesley College.
W. M. DAVIS,
Professor of Geology at Harvard University.
R. DEC. WARD,
Professor of Meteorology at Harvard University.

CAMBRIDGE, MASS., *January*, 1897.

LIQUID AIR.

The students of chemistry are familiar with the fact that a century ago Lavoisier foresaw the novel chemical results that would be realized if ever we should be able to cool and compress gases down to the point of liquefaction, but the realization of his ideas was reserved for the present generation of physicists. Faraday and Thilorier first distinguished themselves by the production of liquid and solid carbonic acid gas, but a later generation, Pictet in Geneva, Cailletet in Paris, Olzeffski and Wroblenski in Cracow, Ramsay and Dewar in London, have reduced many other gases, including oxygen, nitrogen, and, possibly, hydrogen to the liquid condition. Improvements and simplifications in the apparatus have been made from time to time, but it seems to have attained its simplest and most efficient construction in the hands of Dr. Karl Linde, Professor of Applied Thermo-dynamics in the Royal Bavarian Technical High School at Munich. The simple principles of thermo-dynamics which underlie Dr. Linde's apparatus are, in fact, of daily application in the workings of the free atmosphere itself. When any portion of the atmosphere is pushed up to a higher level it cools by expansion, that is to say, the internal molecular energy called heat is drawn upon to do external work or heat is transformed into work and the mass of gas from which the heat is thus withdrawn necessarily cools; vice versa, when air is brought down to a lower level it is compressed by the weight of the additional atmosphere above it and is warmed, that is to say, external work is done upon it, just as when we hammer a piece of lead a portion, or in the case of the air, all the external work is converted into heat.

We are indebted to Mr. O. L. Fassig for an early number of the *Vossische Zeitung* of Berlin, January 12, 1897, containing the following account of a recent public lecture by Prof. Dr. Karl Linde before the Berlin Association of Engineers, Illustrating as it does the results of a special application of processes that go on daily before our eyes in the free atmosphere, these experiments must, therefore, have as much interest for the meteorologist as they have for the physicist. In the early part of this century "the cold of elevation" was often spoken of without any clear conception of the fact that in the process of elevation the air is cooled by the internal work done in expansion; generally it would seem that the air was supposed to cool by contact with the ground or by mixture with other colder air. Physicists knew that gases cooled by expansion, but Espy seems to have been the first who realized the importance to meteorology of both expansion and compression. Probably we are not even yet ready to accept the widest application of the principles of warming by compression, although the fullest range is given to those who invoke the cooling by expansion. In fact, however, whether the air ascends in small masses, as in tornadoes, or in large masses, as in the passage of westerly winds over the Andes and the Rocky Mountains, there must be a corresponding amount of descending air, and this must be warmed by compression. The air that ascends and cools in the equatorial regions, like the air that ascends and cools on the easterly side of an area of low pressure, must have a counterbalancing mass of descending air somewhere within the atmosphere. If in one region the cooling due to expansion is partially counterbalanced by the warming due to the evolution of the latent heat of the moisture that is condensed by the cooling, then in some other region, and to an equivalent extent, the warming of this same air by compression as it subsequently descends must be partially counterbalanced by some cooling process, such as the radiation of heat from the gas, or from the vapor or the dust that it contains. If this were not the case, we should be liable to extremely high temperatures whenever and wherever a mass of air descends. Illustrations of rapid descent and consequently warm weather are to be found not

only in the fœhn and dry chinook winds but on the south side of our low areas and, notably, over large portions of the Mississippi Valley and the eastern slope of the Rocky Mountains, which are subject to occasional extremely high temperatures, relatively speaking, without any special increase in the heat from the sun or the clearness of the sky.

But to return to the lecture by Professor Linde, the *Vossische Zeitung* says:

The January meeting, held on the 6th of January under the presidency of Privy Counselor Professor Rietschel, was one of the greatest events in the history of the Berlin Society of Engineers. Prof. Dr. Karl Linde of Munich exhibited his magnificent experiments on the condensation of gases and showed liquid air in such quantities that it was handed around to the audience by the glassful. In order that these experiments might be made, the session was not held in the usual place of meeting, but in the electro-technical lecture room of the Technical High School at Charlottenburg near Berlin, and among the audience which filled up every corner of the large hall were to be seen nearly every person of note among the professional engineers, the teachers of engineering and the higher technical authorities. The lecture began with a dissertation on the physical conditions attending the condensation of gases. At certain pressures every gas has certain "critical" temperatures at which it begins to become fluid. For atmospheric air under a pressure of 39 atmospheres the critical temperature is —140° C.; at ordinary, or one atmosphere, —191° C. Now the the question is how this low temperature is to be produced. One way is, first, to prepare fluid carbonic acid, then with the help of the cold of evaporation of this substance (—50° C.) to prepare acetylene or some other liquid gas whose boiling point is considerably lower than that of the liquid carbonic acid. This method has, however, been abandoned as too laborious and expensive. Much simpler is the method by the compression of the gas and its expansion after cooling; that is to say, on the principle of the ordinary cold air machine, only of a more perfect construction. When a gas is compressed it becomes warm; when released so that it occupies the original space, there occurs a cooling back to the original temperature. If, however, the heated gas be cooled off while it is still compressed and then allowed to expand there will result a cooling to some point below the original temperature and this temperature will, in fact, be lower in proportion to the cooling of the compressed gas. A very ingenious apparatus has now been contrived in which the cooling of the condensed gas is effected by means of its own cooling by expansion. A small metal tube is placed within a larger one; the compressed gas is forced into the small tube. A throttle valve on the end of the small tube allows a diminution of pressure and at the same time the conduction of a part of the expanded and cooled gas backward through the larger tube. The direction of the flow of the gas in the large tube is therefore opposite to that in the small tube so that the cooling takes place in the most perfect manner. By the repetition of this process the second diminution of pressure brings the gas down to the ordinary atmospheric pressure and by a second application of the cooling flow in the opposite direction we attain extraordinary low temperatures and in this way succeed in liquefying the air itself.

A double compressor first compresses the air to 16 and then to 200 atmospheres; vice versa in the cooling tubes the first throttle valve allows a diminution of the pressures to 16 atmospheres and the second to one atmosphere. The liquid air thus obtained, since of course it will not remain liquid under ordinary conditions, but will very rapidly evaporate, is collected and preserved in glass flasks having double walls.

The space between the two walls of the glass flask is exhausted of the air and a few drops of quicksilver are inserted therein. This quicksilver evaporates into the vacuous space and forms a mirror by condensing on the cold inner glass wall. This mirror hinders the radiation of heat while the vacuum hinders the conduction of heat. In this way scarcely a thirtieth part of the heat enters the liquid that would under ordinary circumstances penetrate into the interior of the flask.

It is well known that the air is a mixture of four parts of nitrogen and one part of oxygen and since the nitrogen is liquefied at a temperature about 10° C. lower than that of oxygen, it is apparent that at the beginning of the liquefaction more oxygen than nitrogen passes over into the liquid condition. We are, therefore, dealing not strictly with fluid air, but with a mixture of oxygen and nitrogen that is richer in oxygen than ordinary air. The liquid exhibited to the audience consisted of about one-third nitrogen and two-thirds oxygen. It demonstrated its richness in oxygen visibly by its delicate blue color since oxygen is blue and nitrogen colorless, as, also, by the readiness with which a glowing bit of wood dipped into it flamed and burned, as also, by the increased heat produced in a flame of gas when this vapor was conducted into it; the lecturer showed this heat effect by means of the well-known Drummond lime light. The extreme coldness of the liquid was demonstrated by the formation of fog in the neighboring air, as also by the behavior of the fluid when poured into an enameled dish having the temperature of the room; in this case the fluid circled around until the dish was cooled precisely as in the Leidenfrost experiment when water is dropped into a heated platinum dish. Such extraordinary cold produces burns on human skin similar to those produced by great heat. Therefore, one must handle the cold glass vessels with great care; in the enthusiasm of the experiment the lecturer himself received such a blister, which, therefore, served as a further illustration of the low temperature of the liquid. Mercury and alcohol froze when in contact with the liquid air.

What the lecturer said as to the possibility of the industrial applications of liquid air or liquid oxygen was of importance. Of course the separation of the two portions of the air into one that liquefies easily and one that liquefies with more difficulty suggests the question whether we have not here found a method of cheaply manufacturing oxygen on a large scale. In one hour and with the expenditure of one horse-power, and therefore for one pfennig (one-quarter of a cent) five cubic meters of air can be liquefied. When we reflect that for industrial applications pure oxygen is not necessary, but that a mixture of equal parts of oxygen and nitrogen will suffice, we see at once that here there really is much promise for the future. Industrial chemistry is already paying great attention to this matter; experiments have already been made looking to the application of liquid air to the preparation of chlorine and sulphuric acid. A greater purity of the liquid oxygen is certainly desirable in the transportation of the liquid in "bomben," or shells, corresponding to the transportation of liquid carbonic acid.

THE VALUE OF THE METER AND YARD.

The REVIEW for December, 1896, page 462, gives the value of the yard that is recommended for adoption by the International Bureau; 0.9143992 meter, or 1 meter equals 1.0936143 yard, or 39.370113 inches. It is not recommended that one should adopt 0.91439916 meter, whence would follow, 39.370115 inches. The latter value has been commended to the Editor as the proper result of the work of the International Bureau, but it is best to adhere to the value recommended by that body.

INTERNATIONAL CLOUD OBSERVATIONS AT TORONTO.

In connection with the articles on international cloud observations in the United States, the Editor has received (too late for insertion on a former page), through Prof. R. F. Stupart, Director of the Canadian Meteorological Service, the following special contribution describing the method of observation in use at the Toronto Observatory.

CLOUD OBSERVATIONS AT TORONTO.

By F. L. BLAKE, Astronomical Assistant, Meteorological Observatory (March 5, 1897).

Observations for cloud heights, velocities, and directions were commenced at Toronto on September 21, 1896. Some time had been previously taken up in locating suitable stations and determining the bearing of the base line, its length, the instrumental errors of the instruments, and making telephonic communication. The roof of the School of Practical Science, a little to the east of the Observatory grounds, was chosen as one station and called *A* (all the cloud heights being referred to it), and for the other the roof of St. Andrew's Market, this station being called *B*. These stations are visible from one another and numerous observations of the sun were taken from each to establish the bearing, the resulting adopted direction being S. 15° 23.6′ W. from *A*. The length of the base line was accurately determined by rectangular chaining with a 100-foot steel ribbon chain and ascertained to be 1552.4 meters.

The instruments consist essentially of two ordinary surveyors' theodolites, the telescopes being removed and a long axis made for each and mounted in the Y's of the standards. These axes project some 4 or 5 inches clear of each side of the theodolite, and on one arm is mounted a sighting tube with cross wires at the object end and small adjustable pin hole at the eye end; on the other arm is fixed a camera for the instantaneous taking of cloud photographs; attached to each

axis is a vertical circle for elevations reading to half minutes. The zeros of the azimuth plates are made to correspond with the direction of the base line and read from the south through the west completely around the circle. The method of taking the observations is as follows: The chief observer selects some well defined point of a cloud and telephones its position and other information as to its situation and form to the observer at the other station, and on his identifying it the two observers, upon a telephone signal, sight it at the same instant of time. The time is recorded; the two altitudes and azimuths are then read, and the cloud is allowed to drift on as long as the selected point retains its form when a second pointing is taken and altitudes and azimuths are read and time interval ascertained. This interval varies at different observations from about 40 seconds to 8 or 10 minutes. Here comes in the great uncertainty of this kind of observation, the lower cumulus clouds of about 1,000 meters elevation present, as a rule, well-defined points, but these change so rapidly, and their aspect as viewed from the two stations are so different, that at times it is almost impossible to get a good observation. In fact the observer, after reading his angles in many cases, can not identify the point he has selected (although well defined at the time) after an interval of only thirty seconds, and notwithstanding the fact that he looks occasionally at the cloud during the operation of reading the instrument.

Stratus clouds, as a rule, are difficult to observe. Rifts appearing here and there afford chances, but these change so much that not more than a minute or a minute and a half can be depended upon for a time interval.

The higher cirrus clouds, especially when there are any signs of nuclei, present a fair field for observations, but being so far distant they require pretty accurate pointing.

The uncertainties of the pointings on the clouds mask any small changes taking place in the instrument, such as changes in the level, and these are taken no notice of after the instruments are once adjusted and occasionally verified.

Station *B* is some 20 meters lower than *A*, but the station is assumed to be in the same plane as *A*, to simplify the calculations. Four observations are thus made, two at each station, from which four heights the velocity and direction of the clouds are obtained. Generally the heights, etc., of the higher clouds are calculated, but the lower clouds and alto-cumuli of about 4,000 meters are plotted on a specially made table, the base line being laid down on a scale of about 300 meters to the inch, using two protractors of three feet radius with vernier reading to minutes, having their centers at each of the stations. The vernier is attached to a movable arm, which can be applied to either station. The angles as read by the instruments are plotted on the table, and the heights, distances, and directions scaled off.

Not much photography has been done as yet, it having been found that in practice great difficulty is encountered in keeping the cameras in adjustment. These cameras were mounted primarily to act as an auxiliary in confirming the accuracy of the pointings of the telescopic tubes and to help in the classification of clouds and show any peculiarity in their formation. By constant practice the observers have become familiar with the descriptions of the clouds and the points to be taken, so that now comparatively few failures result from a misunderstanding of directions, thus rendering photographic work less necessary.

During December, January, and February the weather here has been very cloudy, affording few opportunities for observation.

Roughly speaking, the higher cirrus during September and October was found to move from the direction of about N. 40° W., while through November, December, January, and February they shifted to N. 65° W., at elevations ranging between 8,140 to 10,300 meters and traveled at velocities varying from 60 to 113 miles per hour. The highest cirrus measured was on September 24, at an altitude of 10,300 meters, with a velocity of 79 miles per hour, moving from N. 39° 13′ W., while the lowest was at 8,140 meters, moving at 55 miles per hour from N. 64° W., on October 29.

Medium-height clouds, such as alto-cumulus, cirro-stratus, etc., seem to occupy heights of from 4,000 to 7,000 meters, traveling in directions varying between S. 50° W. and N. 50° W., at velocities of from 30 to 70 miles per hour.

Lower cumulus clouds generally come from the southwest and northwest at altitudes of 1,200 to 2,500 meters and velocities of 10 to 45 miles per hour.

Of the lower cloud drift, such as scud, some observations have been obtained at elevations of 600 to 1,000 meters, with velocities of about 25 miles per hour.

A sufficient number of observations has not as yet been obtained to afford data on which to base satisfactory conclusions, but it is hoped that during the year great progress will be made both in the instrumental and photographic method.

METEOROLOGICAL TABLES.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

Table I gives, for about 130 Weather Bureau stations making two observations daily and for about 20 others making only the 8 p. m. observation, the data ordinarily needed for climatological studies, viz, the monthly mean pressure, the monthly means and extremes of temperature, the average conditions as to moisture, cloudiness, movement of the wind, and the departures from normals in the case of pressure, temperature, and precipitation; the altitudes above ground, the total depth of snowfall, and the mean wet-bulb temperatures are now given.

Table II gives, for about 2,400 stations occupied by voluntary observers, the extreme maximum and minimum temperatures, the mean temperature deduced from the average of all the daily maxima and minima, or other readings, as indicated by the numeral following the name of the station; the total monthly precipitation, and the total depth in inches of any snow that may have fallen. When the spaces in the snow column are left blank it indicates that no snow has fallen, but when it is possible that there may have been snow of which no record has been made, that fact is indicated by leaders, thus (. . . .).

Table III gives, for about 30 Canadian stations, the mean pressure, mean temperature, total precipitation, prevailing wind, and the respective departures from normal values. Reports from Newfoundland and Bermuda are included in this table for convenience of tabulation.

Table IV gives detailed observations at Honolulu, Republic of Hawaii, by Curtis J. Lyons, meteorologist to the Government Survey.

Table V gives, for 26 stations, the mean hourly temperatures deduced from thermographs of the pattern described and figured in the Report of the Chief of the Weather Bureau, 1891–'92, p. 29.

Table VI gives, for 26 stations, the mean hourly pressures as automatically registered by Richard barographs, except for Washington, D. C., where Foreman's barograph is in use.

Both instruments are described in the Report of the Chief of the Weather Bureau, 1891–'92, pp. 26 and 30.

Table VII gives, for about 130 stations, the arithmetical means of the hourly movements of the wind ending with the respective hours, as registered automatically by the Robinson anemometer, in conjunction with an electrical recording mechanism, described and illustrated in the Report of the Chief of the Weather Bureau, 1891–'92, p. 19.

Table VIII gives, for all stations that make observations at 8 a. m. and 8 p. m., the four component directions and the resultant directions based on these two observations only and without considering the velocity of the wind. The total movement for the whole month, as read from the dial of the Robinson anemometer, is given for each station in Table I. By adding the four components for the stations comprised in any geographical division one may obtain the average resultant direction for that division.

Table IX gives the total number of stations in each State from which meteorological reports of any kind have been received, and the number of such stations reporting thunderstorms (T) and auroras (A) on each day of the current month.

Table X gives, for 56 stations, the percentages of hourly sunshine as derived from the automatic records made by two essentially different types of instruments, designated, respectively, the thermometric recorder and the photographic recorder. The kind of instrument used at each station is indicated in the table by the letter T or P in the column following the name of the station.

Table XI gives a record of rains whose intensity at some period of the storm's continuance equaled or exceeded the following rates:

Duration, minutes..	5	10	15	20	25	30	35	40	45	50	60	80	100	120
Rates pr. hr. (ins.)..	3.00	1.80	1.40	1.20	1.08	1.00	0.94	0.90	0.86	0.84	0.75	0.60	0.54	0.50

In the northern part of the United States, especially in the colder months of the year, rains of the intensities shown in the above table seldom occur. In all cases where no storm of sufficient intensity to entitle it to a place in the full table has occurred the greatest rainfall of any single storm has been given, also the greatest hourly fall during that storm.

Table XII gives the record of excessive precipitation at all stations from which reports are received.

NOTES EXPLANATORY OF THE CHARTS.

Chart I.—Tracks of centers of high pressure. The roman letters show number and order of centers of high areas. The figures within the circles show the days of the month; the letters *a* and *p* indicate, respectively, the 8 a. m. and 8 p. m., seventy-fifth meridian time, observations. The queries (?) on the tracks show that the centers could not be satisfactorily located. Within each circle is given the highest barometric reading reported near the center. A blank indicates that no reports were available. A wavy line indicates the axis of a ridge of high pressure.

Chart II.—Tracks of centers of low pressure. The roman letters show number and order of centers of low areas. The figures within the circles show the days of the month; the letters *a* and *p* indicate, respectively, the 8 a. m. and 8 p. m., seventy-fifth meridian time, observations. The queries (?) on the tracks show that the centers could not be satisfactorily located. Within each circle is given the lowest barometric reading reported near the center. A blank indicates that no reports were available. A wavy line indicates the axis of a trough or long oval area of low pressure.

Chart III.—Total precipitation. The scale of shades showing the depth of rainfall is given on the chart itself. For isolated stations the rainfall is given in inches and tenths, when appreciable; otherwise, a "trace" is indicated by a capital T, and no rain at all, by 0.0.

Chart IV.—Sea-level isobars, surface isotherms, and resultant winds. The wind directions on this Chart are the computed resultants of observations at 8 a. m. and 8 p, m., daily; the resultant duration is shown by figures attached to each arrow. The temperatures are the means of daily maxima and minima and are not reduced to sea level. The pressures are the means of 8 a. m. and 8 p. m. observations, daily, and correspond to Professor Hazen's system of reduction; the barometer is not reduced to standard gravity, but the necessary reduction for 30 inches of the mercurial barometer is shown by the marginal figures for each degree of latitude.

Chart V.—Total snowfall, with the isotherms of mimimum 32° F., and minimum 40° F.

Chart VI.—Depth of snow on ground at close of month.

Chart VII.—Curves of probable maximum intensity of rainfall.

TABLE I.—*Climatological data for Weather Bureau Stations, January, 1897.*

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.									Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.						Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometers above ground.	Mean actual, 8 a. m. and 8 p. m. + s.	Mean reduced.	Departure from normal.	Mean max. and min. + s.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.				Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					
New England.																														
Eastport	78	69	74	29.90	30.00	.00	26.8	+ 0.5	52	5	38	—14	19	14	37	19	14	74	3.57	— 0.4	13	10,843	nw.	66	e.	28	9	9	13	6.5	16.2
Portland, Me.	103	81	89	29.89	30.00	— .05	21.2	+ 0.9	51	5	31	— 8	19	16	36	21	17	77	3.14	— 0.8	8	6,308	nw.	36	n.	18	10	13	8	5.1	16.8
Northfield	872	15	59	29.07	30.08	+ .01	23.6	+ 3.5	51	5	36	—18	25	7	50	14	11	81	4.09	+ 0.5	5	9,818	sw.	42	ne.	17	7	8	16	6.7	33.0
Boston	135	115	181	29.91	30.05	— .02	16.2	+ 1.4	51	3	25	—18	2	2	34	14	20	70	3.46	— 0.9	12	6,281	s.	44	s.	28	9	6	16	6.1	18.2
Nantucket	14	43	54	30.04	30.05	+ .01	28.4	+ 3.0	60	5	36	2	10	25	35	29	26	82	2.59	— 1.1	12	10,218	nw.	48	nw.	28	6	12	13	6.5	8.5
Woods Hole		51	57				30.8	+ 0.1	54	5	36	6	30	24	30				3.46	— 0.3	6	12,746	w.	56	w.	18	10	14	7	4.7	15.5
Vineyard Haven		20					29.4	— 1.9	53	5	34	9	20	25	35				3.89	+ 0.3	7		nw.									9.5
Block Island	37	39	48	30.07	30.10	+ .01	32.4	— 2.6	56	5	36	9	20	25	35				3.93	— 0.3	10	13,843	nw.	53	nw.	28	9	3	15	3	13	....	12.5
Narragansett Pier		10					30.4	— 2.6	55	5	36	9	20	30	30				4.15	— 1.2	7		nw.									25.5
New Haven	107	118	140	29.97	30.09	— .03	32.4	— 0.8	55	5	36	5	20	21	30	28	23	72	3.85	— 0.5	11	8,017	w.	41	w.	18	10	9	12	5.7	
Mid. Atlan. States.							32.7	+ 0.6	53	5	36								2.08	— 1.7												
Albany	97	84	113	30.00	30.11	+ .01	32.9	+ 0.9	52	4	36								1.62	— 1.3	8	6,556	w.	42	se.	17	6	9	16	7.0	11.8
Binghamton	875	79	90				31.6	— 1.8	52	4	32	— 4	31	18	33	23	19	81	1.11	.....	13	6,429	w.	43	s.	17	2	10	19	7.5	14.2
New York	314	298	326	29.76	30.12	— .00	24.7	+ 0.5	52	4	32	0	*	17	37				1.11	.....	13	6,429	nw.	60	nw.	18	11	7	13	5.5	11.7
Harrisburg	377	94	102	29.74	30.18	+ .06	23.8	.....	57	4	30	5	25	32	39	26	21	77	3.51	— 0.5	11	11,495	nw.	40	w.	23	11	4	16	6.0	7.3
Philadelphia	117	168	184	30.02	30.15	— .01	29.4	— 1.5	54	5	36	7	25	32	29	26	21	78	1.60	— 2.0	10	7,774	nw.	36	nw.	24	10	7	14	5.6	7.8
Atlantic City	53	68	76	30.09	30.14	+ .01	27.7	— 1.3	61	4	33	7	26	32	39	24	21	74	2.17	— 1.2	11	8,422	nw.	43	nw.	18	11	10	10	5.2	12.4
Baltimore	123	68	82	30.03	30.17	+ .01	30.8	— 1.5	54	4	33	7	25	32	39	25	21	78	2.50	— 1.3	11	9,611	nw.	28	w.	23	10	8	13	5.5	4.7
Washington	112	59	76	30.07	30.20	+ .02	30.8	— 2.7	60	4	38	8	26	32	30	26	21	71	2.05	— 1.3	13	4,558	w.	40	nw.	28	15	3	13	5.0	6.7
Cape Henry		5	34				31.6	— 1.6	64	4	39	11	26	32	39				1.98	— 1.5	10	6,316	nw.				13	8	10	....	1.4
Lynchburg	685	83	88	29.44	30.22	+ .05	31.0	— 1.9	63	4	42	8	26	32	34				0.92	— 3.3												
Norfolk	57	88	93	30.13	30.30	+ .04	37.8	— 3.3	60	21	44	11	28	32	32	29	24	73	2.19	— 1.8	11	3,957	nw.	28	nw.	23	12	10	9	5.0	6.7
S. Atlantic States.							33.6	— 2.2	68	4	45	11	28	32	34	30	30	78	1.47	— 2.4	10	6,269	n.	40	nw.	18	14	5	12	5.2	1.5
Charlotte	773	67	76	29.34	30.20	+ .02	38.3	— 3.3	63	4	42	15	29	32	33				1.96	— 2.3												
Hatteras	11	17	36	30.17	30.18	+ .02	43.6	— 3.3	68	4	45	18	29	38	32	36	32	73	2.53	— 2.6	10	4,930	e.	26	sw.	22	14	5	12	5.2	1.1
Kittyhawk	9	12	30	30.18	30.19	+ .03	37.1	— 4.1	62	3	45	18	29	38	32	32	28	82	2.00	— 3.9	9	11,438	n.	44	w.	28	9	11	11	5.5	0.0
Raleigh	375	93	101	29.80	30.21	+ .04	43.0	— 2.6	64	4	46	16	29	34	34	37	32	70	1.35	— 3.8	7	11,242	n.	48	s.	21	11[b]	5[b]	13[b]	5.1	T.
Wilmington	78	82	88	30.12	30.21	+ .04	37.9	— 2.0	60	21	46	9	29	34	29	32	26	67	2.23	— 1.3	10	4,932	n.	32	nw.	18	12	7	12	5.3	1.8
Charleston	32	60	72	30.17	30.32	+ .04	40.2	— 3.7	68	4	52	14	29	35	30	36	32	70	1.76	— 2.2	9	6,453	n.	34	w.	28	15	8	8	4.4	T.
Columbia		5					43.6	— 3.7	71	4	54	19	28	38	33	41	36	70	0.84	— 3.2	7	6,379	ne.	30	ne.	31	12	13	6	4.9	0.0
Augusta	180	89	103	30.01	30.21	+ .04	47.4	— 2.5	71	4	54	19	28	38	34				2.38	— 1.5	9	.....	ne.				10	8	13	....	T.
Savannah	98	63	86	30.11	30.32	+ .02	42.0	— 4.4	67	3	51	10	28	35	32	38	32	69	3.24	— 1.2	10	5,336	w.	27	w.	27	12	7	12	5.2	
Jacksonville	43	69	84	30.15	30.30	+ .02	44.0	— 3.4	69	3	54	12	28	40	32	42	38	73	1.49	— 1.8	9	6,732	nw.	28	w.	27	9	13	10	5.5	
Florida Peninsula.							48.2	— 3.4	71	4	57	17	28	40	33	46	42	75	1.89	— 1.4	7	5,386	nw.	25	sw.	11	9	13	10	5.5	
Jupiter	28	13	30	30.14	30.16	.00	52.1	— 3.2	76	4	61	21	28	43	37				3.51	— 0.8												
Key West	22	42	50	30.14	30.16	+ .02	62.6	— 2.9											5.20	+ 1.8	4	7,993	nw.	36	e.	31	9	12	10	5.6	
Tampa	36	60	68	30.15	30.19	+ .01	62.6	— 4.4	80	21	70	34	29	56	46	56	52	78	3.90	+ 1.8	6	8,189	ne.	34	ne.	29	9	12	10	5.3	
East Gulf States.							57.6	— 2.8	79	21	72	39	29	49	37	51	48	78	1.42	— 1.1	7	4,920	ne.	36	sw.	26	10	14	7	4.8	
Atlanta	1,131	92	126	28.99	30.24	+ .03	57.6	— 1.5	78	1	67	29	29	49	37				3.37	— 1.8												
Pensacola	56	78	90	30.15	30.21	+ .02	58.6	— 3.7	83	3	46	6	28	31	28	34	30	74	3.48	— 2.7	10	8,936	nw.	34	e.	30	8	9	14	5.7	0.1
Mobile	57	88	96	30.16	30.22	+ .03	47.5	— 3.3	73	17	57	17	28	40	35	43	38	75	0.74	— 3.9	9	8,406	n.	42	e.	31	7	11	13	6.0	
Montgomery	221	100	107	29.97	30.22	+ .02	49.6	— 2.7	76	17	56	18	28	40	35	43	38	75	2.97	— 2.1	9	6,566	nw.	37	se.	1	10	8	13	5.3	T.
Vicksburg	254	65	73	29.92	30.19	— .00	48.2	— 2.7	74	3	54	14	28	39	32	40	35	75	3.26	— 2.1	8	5,780	n.	31	s.	3	10	10	11	5.3	T.
New Orleans	54	112	120	30.15	30.21	+ .05	44.8	— 3.4	71	2	54	17	28	38	32	41	36	74	6.24	+ 0.7	11	6,131	n.	40	se.	3	7	5	19	7.0	1.0
Port Eads		27					45.8	— 0.5	74	13	58	23	28	44	33	46	42	77	1.92	— 3.2	11	7,829	ne.	26	s.		7	1	23	....	
West Gulf States.							51.1	— 2.7	73	2	61	28	28	48	33				5.01	+ 0.6	8	.....	n.									
Shreveport	249	77	84	29.93	30.21	+ .02	54.0	— 2.7											4.60	+ 1.1												
Fort Smith	481	63	72	29.66	30.20	+ .02	45.9	— 0.5	73	2	52	7	27	37	33	40	34	70	5.84	+ 1.2	13	6,243	nw.	36	se.	1	8	9	14	6.6	3.5
Little Rock	302	71	79	29.88	30.20	+ .03	45.0	+ 1.0	72	2	47	12	27	37	30	34	35	67	4.83	+ 2.5	9	5,741	e.	32	se.	4	14	2	15	5.5	1.3
Corpus Christi	20	42	50	30.18	30.20	+ .03	38.2	+ 1.8	76	2	48	12	27	37	32	35	32	76	8.51	+ 3.6	9	6,062	n.	44	nw.	2	13	2	13	5.9	0.1
Galveston	42	85	96	30.18	30.32	+ .06	39.8	— 0.5	70	2	58	21	27	47	32	39	37	85	2.57	— 0.3	13	8,254	n.	35	se.	12	5	7	19	6.7	8.0
Palestine	510	54	61	29.66	30.23	+ .03	52.8	— 0.7	76	1	54	11	27	37	32	40	35	74	2.97	— 0.7	10	9,480	ne.	44	nw.	19	9	8	19	6.7	3.0
San Antonio	704	95	104	29.46	30.23	+ .06	50.9	— 1.4	78	1	58	18	27	41	32	43	38	73	5.95	+ 1.6	12	5,396	n.	37	se.	2	6	8	17	6.4	3.0
Ohio Val. & Tenn.							45.2	— 0.0	78	1	54								1.55	— 0.2	8	6,353	n.	32	n.	25	8	8	4	6.5	0.2
Chattanooga	762	106	112	29.40	30.25	+ .06	49.2	— 2.3	76	1	58								2.77	— 1.5												
Knoxville	980	80	88	29.14	30.23	+ .03	51.7	— 1.9											3.06	— 3.6	9	6,546	nw.	34	se.	17	7	11	13	5.9	2.8
Memphis	399	140	154	29.77	30.21	+ .02	38.6	— 2.6	64	3	47	6	29	30	33	36	34	67	2.91	— 2.6	8	4,516	w.	29	s.	3	12	6	13	5.5	4.5
Nashville	545	138	134	29.61	30.22	+ .03	35.8	— 2.3	68	3	45	— 3	26	32	31	36	32	75	4.63	— 0.9	8	6,461	nw.	32	s.	3	15	6	13	5.6	0.3
Lexington	989	75	122	29.07	30.19	+ .06	39.4	— 0.0	68	2	48	10	26	37	34	31	25	67	3.13	— 2.0	8	9,017	nw.	46	se.	3	13	8	10	5.1	1.5
Louisville	525	114	136	29.60	30.20	+ .02	35.7	— 1.2	67	4	44	3	26	35	31	35	27	72	4.63	— 2.0	8	6,461	nw.	40	sw.	17	7	7	17	6.9	8.6
Indianapolis	823	154	164	29.26	30.19	+ .03	30.0	— 1.0	67	3	38	— 6	26	32	29	28	22	69	3.13	— 1.6	12	10,399	nw.	48	nw.	17	7	9	8	14	6.3	4.6
Cincinnati	628	152	157	29.49	30.21	+ .04	32.0	— 0.6	69	3	40	— 4	26	36	28	29	23	78	3.29	— 0.7	12	7,572	sw.	40	sw.	17	7	9	15	6.3	13.9
Columbus	824	87	100	29.25	30.19	+ .04	25.0	— 2.0	64	3	32	—14	25	32	32	24	19	78	3.71	+ 0.7	16	9,144	w.	57	sw.	17	7	9	16	6.3	8.0
Pittsburg	842	116	126	29.23	30.18	+ .03	29.0	— 3.2	66	3	34	—10	25	32	31	25	20	83	2.48	— 1.0	18	7,213	w.	41	w.	22	5	7	19	7.4	3.5
Parkersburg	638	77	84	29.48	30.21	+ .06	32.0	— 1.6	64	3	36	—10	25	32	31	25	20	81	1.54	— 1.8	12	6,758	nw.	35	nw.	22	3	13	15	7.4	10.6
Lower Lake Region.							33.9	— 0.3	66	3	34	—10	25	33	33	25	20	83	1.34	— 1.8	15	5,731	w.	34	w.	22	6	9	16	6.6	5.8
Buffalo	768	178	206	29.22	30.10	+ .01	24.0	— 1.3	59	4	31	0	24	18	35	33	32	77	1.76	— 1.4	13	4,989	w.	36	w.	22	6	9	16	6.6	5.8
Oswego	335	76	87	29.68	30.07	— .02	23.2	— 0.2	60	4	31	— 1	25	16	31	31	27	82	2.64	— 0.0												
Rochester	523	81	90	29.48	30.08	— .01	24.1	— 0.7	62	3	31	— 5	25	17	32	32	28	83	3.60	+ 0.6	16	14,322	w.	59	w.	17	7	7	17	7.9	27.8
Erie	714	92	102	29.31	30.12	+ .02	24.5	— 1.8	61	3	31	—15	25	17	32	32	29	78	6.05	+ 3.1	20	10,735	sw.	44	nw.	18	5	3	17	7.9	52.7
Cleveland	762	190	201	29.26	30.13	+ .02	24.0	— 1.5	61	3	30	—15	25	17	32	32	29	80	2.47	— 0.7	20	7,844	w.	36	sw.	26	3	7	21	7.6	20.1
Sandusky	629	62	74	29.42	30.14	+ .03	24.2	— 1.5	61	3	30	—16	25	17	32	32	29	80	2.57	— 0.8	19	11,170	sw.	42	nw.	22	3	4	21	7.8	22.6
Toledo	674	122	127	29.37	30.14	+ .03	23.4	— 1.7	61	3	30	—16	25	17	30	31	29	86	1.85	— 0.7	19	12,782	sw.	51	w.	22	3	4	24	8.2	11.0
Detroit	730	160	166	29.29	30.13	+ .02	23.0	— 2.1	58	3	30	—16	25	17	30	31	29	86	1.14	— 1.1	15	7,197	w.	36	w.	17	5	7	21	7.9	9.3
Upper Lake Region.							19.5	+ 2.5	49	2	27	— 7	24	16	25	30	16	81	1.75	— 0.3	14	8,587	w.	50	sw.	17	3	6	22	8.2	13.2
Alpena	609	61	65	29.34	30.04	— .02	21.6	+ 5.4	49	2	27	— 7	24	16	25	30	16	81	1.65	— 0.3	16	8,283	sw.	48	sw.	17	6	7	18	7.3	8.7
Grand Haven	628	55	64	29.35	30.07	— .00	24.5	+ 0.9	58	2	31	—15	24	11	31	30	16	80	3.56	+ 1.5												
Marquette	734	67	95	29.17	30.02	— .03	18.2	+ 3.9	47	2	25	—13	24	10	28	30	16	79	3.00	+ 0.5	17	7,318	nw.	36	nw.	17	5	6	20	7.5	8.0
Port Huron	639	70	108	29.39	30.12	+ .02	22.5	+ 1.4	56	2	28	—13	24	10	28	30	16	80	7.99	+ 5.3	23	9,355	nw.	38	nw.	22	3	5	23	8.5	33.6
Sault Ste. Marie	634	58	65	29.30	30.12	+ .00	17.0	+ 4.1	44	2	24	—20	24	10	28	30	16	83	2.98	+ 0.9	17	8,391	nw.	48	sw.	17	3	7	17	7.7	30.6
Chicago	634	241	274	29.30	30.14	+ .08	21.8	— 2.3	57	3	28	—18	25	15	31	30	16	83	2.50	+ 0.4	17	9,073	sw.	41	nw.	17	3	8	17	6.8	10.7
Milwaukee	671	106	149	29.35	30.12	+ .02	21.3	— 2.7	56	3	28	—20	24	13	31	30	16	83	4.02	+ 2.2	18	6,729	se.	62	w.	17	10	8	17	6.8	13.1
Milwaukee	617	49	57	29.39	30.11	.00	19.3	— 5.8	51	1	18	—29	24	1	21	30	16	83	4.53	+ 2.4	16	13,912	w.	36	w.	22	9	8	14	6.3	13.1
Greenbay	702	95	106	29.28	30.10	— .01	9.4	— 0.8	43						17	21	13	78	3.86	+ 1.7	20	8,826	nw.	36	w.	22	9	8	14	5.6	1.4
Duluth							4.6	— 3.5		1	11	—28	24	— 7	36	1	— 2	84	1.69	+ 0.4	11	7,521	nw.	38	nw.	17	10	13	8	4.7	13.1
North Dakota.							2.0	— 3.5	37	1	11	—28	24	— 2	41	3	— 3	89	1.48	+ 0.3												
Moorhead	905	54	60	29.07	30.19	+ .02	5.8	— 2.5	42	21	14	—30	24	— 3	36	5	— 2	83	1.08	+ 0.8	8	9,144	nw.	47	nw.	21	6	9	16	6.5	9.7
Bismarck	1,674	16	29	28.29	30.23	+ .04	6.0	— 4.4	38	21	15	—32	*	— 3	36				1.56	+ 0.6	8	7,962	nw.	47	nw.	21	14	11	6	4.1	5.6
Williston	1,875	15	31	28.08	30.24	+ .07	22.6	+ 1.0											1.11	— 0.6	7	6,429	w.	58	n.						
Upper Miss. Valley.							10.6	— 1.3	48	1	18	—26	25	1	33	8	6	84	0.56	— 0.1												
Minneapolis		99					9.4	— 0.6	49	1	18	—26	25	6	35				3.49	+ 1.3												
St. Paul	837	114	134	29.17	30.16	+ .01	14.0	— 0.5	57	1	22	—23	25	14	36	19	15	81	1.66	+ 0.8	11	.....	nw.	30	nw.	17	4	8	18	6.2	19.7
La Crosse		70	78				20.8	— 1.7	63	1	28	—19	25	11	36	17	11	71	2.13	+ 1.2	11	6,152	w.	32	nw.	17	4	9	18	7.6	7.9
Davenport	599	71	79	29.45	30.14	— .01	19.5	— 2.8	61	1	28	—17	25	10	36	16	12	81	1.66	+ 0.4	13	5,065	w.	36	w.	17	9	10	12	6.1	8.5
Des Moines	867	84	88	29.30	30.15	+ .02	17.8	— 1.3	63	1	28	—16	25	8	36	21	18	83	3.58	+ 1.9	14	7,251	w.	33	nw.	17	15	5	11	4.7	13.9
Dubuque	698	60	60	29.34	30.16	+ .01	23.2	— 2.2	66	1	30	— 4	25	16	37	25	21	85	2.02	+ 0.7	14	6,572	nw.	36	w.	22	12	7	12	4.9	5.8
Keokuk	614	64	78	29.46	30.16	+ .01	34.7	— 1.7	66	*	42		25	27	34	30	25	83	2.55	+ 0.9	12	4,746	w.	40	sw.	4	14	3	12	4.9	1.3
Cairo	359	87	93	29.79	30.19	+ .02													4.90	+ 3.2	11	6,903	nw.	38	w.	17	9	7	18	6.2	1.3
																			3.89	+ 0.1	9	7,773	nw.							

TABLE I.—*Climatological data for Weather Bureau Stations, January, 1897*—Continued.

Stations.	Elevation of instruments: Barometer above sea level, feet.	Elevation of instruments: Thermometers above ground.	Elevation of instruments: Anemometers above ground.	Pressure, in inches: Mean actual, 8 a. m. and 8 p. m. + 2.	Pressure, in inches: Mean reduced.	Pressure, in inches: Departure from normal.	Temperature of the air, in degrees Fahrenheit: Mean max. and min. + 2.	Temperature of the air: Departure from normal.	Temperature of the air: Maximum.	Temperature of the air: Date.	Temperature of the air: Mean maximum.	Temperature of the air: Minimum.	Temperature of the air: Date.	Temperature of the air: Mean minimum.	Temperature of the air: Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches: Total.	Precipitation: Departure from normal.	Precipitation: Days with .01, or more.	Wind: Total movement, miles.	Wind: Prevailing direction.	Wind: Maximum velocity: Miles per hour.	Wind: Maximum velocity: Direction.	Wind: Maximum velocity: Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
Up. Miss. Val.—Con																															
Springfield, Ill.	644	82	92	29.44	30.17	.00	35.2	− 0.4	61	2	31	−11	25	19	26	22	18	75	5.91	+ 3.8	12	8,306	nw.	36	w.	17	10	5	16	6.2	6.9
Hannibal	534	75	107	29.57	30.17	.....	36.2	.....	67	1	34	−10	25	18	43	23	20	82	6.36	+ 4.9	15	8,022	nw.	40	nw.	4	13	5	13	5.3	6.4
St. Louis	567	110	210	29.55	30.20	+ .04	30.6	+ 1.9	64	2	37	− 2	26	24	35	27	23	74	3.75	+ 1.6	13	9,324	w.	50	w.	17	11	7	13	5.7	5.2
Missouri Valley.							21.6	+ 2.1											2.77	+ 1.7											
Columbia	.....	4	84	.....	.....	.....	28.8	− 1.6	69	1	38	− 4	25	20	32	.....	.....	.....	6.87	+ 5.0	11	7,859	nw.	39	nw.	17	6	8	17	6.8	2.2
Kansas City	963	78	95	29.13	30.22	+ .02	27.4	+ 1.6	64	1	35	− 4	*	20	43	24	21	79	2.66	+ 1.5	11	7,096	nw.	37	nw.	17	13	7	11	5.1	12.3
Springfield, Mo.	1,324	100	103	28.72	30.19	+ .03	30.4	+ 0.5	65	1	37	− 1	25	24	30	27	24	79	6.47	+ 4.1	13	8,822	nw.	40	w.	4	7	14	10	5.5	7.4
Topeka	.....	81	....	.....	.....	.....	28.4	+ 3.1	61	1	37	− 4	24	20	35	....	....	....	1.45	+ 0.3	10	.....	nw.	....	.....	...	9	9	13	....	4.7
Lincoln	.....	....	...	28.84	30.19	.....	22.6	+ 4.9	51	8	30	−10	24	15	32	21	18	83	0.65	− 0.1	7	8,864	nw.	46	nw.	4	15	5	11	5.1	5.8
Omaha	1,103	92	97	28.94	30.20	− .02	20.9	+ 3.7	51	8	29	−13	25	13	34	18	15	80	0.87	+ 0.2	9	6,507	nw.	29	n.	23	13	7	11	5.2	6.5
Sioux City	1,165	96	109	.....	.....	.....	14.2	− 2.5	45	21	23	−18	25	5	39	....	....	....	1.41	+ 0.6	10	9,690	nw.	46	n.	4	14	3	14	5.6	13.0
Pierre	1,460	80	61	28.55	30.22	+ .02	14.6	+ 6.6	51	7	24	−19	24	6	39	12	10	88	1.66	+ 1.2	8	7,102	nw.	43	nw.	4	10	10	11	5.5	14.9
Huron	1,310	63	72	28.71	30.24	+ .03	7.4	+ 2.4	41	21	16	−26	*	− 2	33	5	1	77	2.87	+ 2.4	11	11,731	nw.	51	nw.	4	7	13	11	5.9	36.7
Northern Slope.							19.2	+ 3.9											0.52	− 0.2											
Havre	2,494	15	33	27.41	30.21	+ .06	13.4	+ 8.1	53	7	23	−38	24	3	35	11	8	81	0.53	− 0.4	5	6,725	w.	50	ne.	21	13	13	5	4.3	5.3
Miles City	2,372	41	49	27.55	30.21	+ .03	14.9	+ 4.8	54	21	24	−38	24	6	31	14	9	77	0.69	+ 0.1	8	4,238	s.	45	nw.	21	16	9	6	4.7	6.6
Helena	4,108	88	98	25.90	30.31	+ .19	20.8	+ 5.5	49	*	28	−34	25	13	54	17	11	64	0.80	− 0.6	8	3,609	sw.	40	sw.	21	10	8	13	5.9	6.8
Rapid City	3,260	53	61	26.63	30.30	+ .02	21.0	+ 1.8	64	8	32	−20	25	10	40	17	12	77	0.62	+ 0.3	7	6,216	sw.	36	nw,	21	10	11	10	5.1	6.1
Cheyenne	6,105	58	60	23.96	30.29	+ .10	21.8	0.0	56	8	35	−21	27	12	51	18	4	49	0.27	− 0.1	5	8,720	nw.	48	nw.	21	12	10	9	5.4	2.7
Lander	5,372	26	36	24.66	30.35	+ .13	15.0	+ 0.3	55	21	28	−15	27	2	45	11	7	76	0.23	− 0.6	5	2,056	sw.	24	ne.	23	11	12	8	3.8	2.3
North Platte	2,826	43	52	27.14	30.24	+ .03	25.2	+ 7.3	58	8	35	− 9	27	15	43	20	15	75	0.47	0.0	4	7,630	w.	46	nw.	4	15	10	6	4.1	4.4
Middle Slope.							29.1	+ 2.6											0.97	+ 0.1											
Denver	5,290	83	151	24.72	30.28	+ .09	26.6	− 0.1	59	22	39	−14	27	15	48	21	11	55	0.58	0.0	4	5,264	s.	45	ne.	23	10	16	5	4.6	6.1
Pueblo	4,713	74	81	25.28	30.23	+ .09	26.4	− 1.9	66	23	38	−16	27	14	47	21	13	63	0.55	+ 0.2	4	4,481	nw.	37	nw.	16	14	12	5	4.7	5.0
Concordia	1,398	42	47	28.63	30.21	− .01	28.0	+ 6.6	59	8	36	− 6	24	20	36	23	20	78	0.91	+ 0.1	9	5,959	s.	36	nw.	4	14	7	10	5.0	7.2
Dodge City	2,504	44	52	27.48	30.23	+ .05	28.2	+ 4.6	58	23	38	− 3	24	19	55	24	21	80	1.44	+ 1.0	6	8,050	nw.	36	n.	3	14	10	7	3.9	15.9
Wichita	1,351	78	85	28.71	30.21	+ .05	30.8	+ 2.8	59	16	39	− 1	24	23	38	26	21	74	1.23	+ 0.2	8	7,202	s.	39	n.	2	17	3	11	4.5	6.8
Oklahoma	1,218	54	53	28.88	30.24	+ .06	34.8	+ 3.7	63	1	44	3	27	26	37	29	25	77	1.10	− 0.8	9	6,125	n.	36	n.	24	17	3	11	4.7	5.1
Southern Slope.							33.2	− 3.2											1.77	+ 1.0											
Abilene	1,749	47	54	28.35	30.26	+ .06	40.0	− 0.5	71	10	49	5	27	31	36	35	31	79	1.28	+ 0.4	10	6,026	n.	32	nw.	2	12	7	12	5.5	4.6
Amarillo	3,691	53	61	26.31	30.25	+ .07	27.6	− 5.9	55	23	35	− 1	27	20	42	25	20	79	2.26	+ 1.7	7	10,741	s.	54	n.	2	15	8	8	4.7	19.7
Southern Plateau.							43.8	+ 0.3											2.04	+ 1.5											
El Paso	3,767	10	110	26.23	30.16	+ .03	41.5	− 2.0	66	24	53	17	5	30	35	34	26	60	0.54	0.0	8	7,159	nw.	42	nw.	16	11	12	8	4.8	3.1
Santa Fe	6,998	47	50	23.21	30.18	+ .01	27.4	− 0.4	48	22	36	− 1	4	19	28	23	17	69	1.11	+ 0.5	9	4,472	ne.	24	ne.	21	13	13	5	4.4	7.6
Phœnix	1,076	47	57	28.88	30.03	.....	51.2	+ 2.2	71	*	62	27	5	40	35	44	36	62	3.67	+ 3.1	10	2,651	se.	17	se.	18	14	9	8	4.3	
Yuma	139	16	50	29.90	30.05	− .03	55.2	+ 1.3	73	23	65	39	6	46	31	46	37	57	2.83	+ 2.4	8	4,973	n.	34	se.	14	14	12	5	3.5	
Middle Plateau.							31.6	+ 3.0											1.10	− 0.6											
Carson City	4,720	47	....	25.28	30.18	.....	33.4	+ 2.4	55	20	44	10	2	22	34	29	24	72	1.36	− 1.2	5	.....	ne.	....	.....	...	10	10	11	5.6	6.8
Winnemucca	4,340	59	70	25.70	30.30	.00	32.6	+ 5.6	53	22	43	10	2	22	35	29	22	67	0.79	− 0.3	11	5,795	sw.	31	ne.	14	8	7	16	6.5	2.0
Salt Lake City	4,344	83	90	25.72	30.29	+ .04	38.8	+ 1.1	48	22	36	9	27	21	32	27	24	83	1.16	− 0.3	11	2,662	w.	15	s.	29	4	7	20	7.5	13.5
Northern Plateau.							26.3	+ 4.2											1.20	− 1.3											
Baker City	3,470	49	47	26.52	30.34	.00	37.0	+ 4.7	45	21	33	− 4	26	20	24	24	21	80	0.74	− 0.9	10	3,675	se.	22	ne.	16	6	5	20	7.2	7.3
Idaho Falls	4,742	10	56	25.30	30.34	+ .10	18.6	+ 3.1	41	21	28	−17	*	9	33	17	14	83	0.67	− 1.7	11	4,960	n.	36	s.	21	11	3	17	5.9	6.4
Spokane	1,943	99	107	28.09	30.32	+ .11	28.9	+ 7.9	49	6	34	3	26	24	21	27	23	80	1.56	− 1.0	14	3,267	ne.	36	sw.	21	5	4	22	8.0	13.2
Walla Walla	1,018	65	73	29.10	30.24	+ .08	30.8	+ 1.0	61	22	35	0	26	26	30	30	29	94	1.85	− 0.6	12	2,440	sw.	23	n.	24	1	12	18	7.1	10.0
N. Pac. Coast Reg.							40.9	+ 1.9											6.66	− 2.1											
Fort Canby	179	10	34	29.82	30.02	.00	42.5	+ 1.6	56	8	46	26	26	39	18	42	40	92	9.58	+ 1.1	18	12,340	e.	54	e.	28	4	3	24	8.0	0.0
Port Angeles	29	47	61	.....	.....	....	39.1	+ 4.4	56	20	44	19	26	34	18	...	....	....	1.77	− 3.7	15	3,490	se.	30	sw.	21	4	8	19	7.6	T.
Pysht	.....	5	....	.....	.....	.....	39.5	.....	52	*	44	22	26	35	17	...	....	....	8.31	− 2.5	19	.....	e.	....	.....	...	5	3	23	....	0.0
Seattle	119	100	108	29.95	30.08	.....	40.0	.....	59	6	44	22	26	36	16	39	36	85	3.74	.....	21	3,472	se.	24	sw.	20	5	8	18	7.5	6.1
Tatoosh Island	86	12	21	29.93	30.03	+ .01	41.9	+ 1.7	52	*	45	30	26	39	15	40	37	79	12.20	− 0.5	21	13,873	e.	60	e.	25	4	0	27	8.7	3.0
Astoria	.....	39	60	.....	.....	.....	41.4	+ 1.3	54	6	45	25	26	38	14	....	....	....	9.84	− 0.7	20	.....	e.	....	.....	...	7	1	23	....	0.3
Portland, Oreg	153	203	213	29.93	30.10	+ .01	38.8	+ 1.0	57	20	43	22	26	34	21	37	34	85	3.25	− 3.9	20	5,784	nw.	35	e.	27	4	10	17	7.1	1.8
Roseburg	521	56	67	29.49	30.07	− .03	41.8	+ 1.5	62	20	47	31	27	36	20	40	39	88	1.66	− 4.5	14	1,730	nw.	18	s.	28	5	14	12	6.5	T.
Mid. Pac. C'st Reg.							47.2	+ 0.2											2.98	− 2.6											
Eureka	64	60	69	30.02	30.08	− .02	48.1	+ 2.1	62	28	54	34	15	42	20	46	43	86	3.04	− 5.4	13	3,465	nw.	34	nw.	12	4	13	14	6.6	
Redbluff	334	54	58	29.75	30.12	− .02	45.8	+ 0.5	65	9	53	33	11	39	28	43	40	83	3.22	− 1.4	11	3,327	nw.	32	se.	28	8	9	14	6.0	
Sacramento	71	106	117	.....	.....	.....	44.2	− 1.5	59	29	50	33	4	39	22	....	....	....	3.66	− 0.2	10	5,076	se.	44	se.	29	5	8	18	7.2	
San Francisco	153	161	167	29.94	30.10	− .03	48.6	− 1.4	60	9	53	40	11	44	15	46	44	84	2.26	− 2.5	8	5,036	n.	37	se.	29	7	12	12	6.0	
Point Reyes Light	.....	12	....	.....	.....	.. .	49.4	+ 1.2	63	8	54	39	13	45	17	....	....	....	2.74	− 3.3	8	.....	nw.	....	.....	...	13	4	14	....	
S. Pac. Coast Reg.							51.7	+ 1.3											2.92	+ 0.8											
Fresno	332	67	70	29.75	30.11	− .04	43.7	− 0.6	61	29	49	30	3	38	24	42	40	88	1.93	+ 0.6	9	2,909	nw.	24	nw.	14	4	5	22	7.8	
Los Angeles	330	74	76	29.70	30.06	− .03	55.6	+ 2.3	79	22	65	37	2	46	29	48	43	68	3.70	+ 0.8	9	3,423	ne.	34	e.	14	13	13	5	4.2	
San Diego	69	59	70	29.97	30.05	− .05	55.8	+ 2.1	73	22	63	40	2	48	23	50	45	71	3.13	+ 1.1	9	3,638	ne.	35	sw.	13	17	7	7	4.2	
San Luis Obispo	201	10	46	29.87	30.09	.....	51.8	.....	74	21	64	30	3	40	38	46	41	72	5.22	.....	9	3,112	n.	23	n.	5	10	12	9	5.0	

NOTE.—The data at stations having no departures are not used in computing the district averages. Letters of the alphabet denote number of days missing from the record. * Two or more directions, dates, or years. † Received too late to be considered in departures, etc.

TABLE II.—*Meteorological record of voluntary and other cooperating observers, January, 1896.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	*Ins.*	*Ins.*
Alco†	78	15	48.0	2.42	
Ashville*†¹	70	4	40.3	4.15	1.8
Bermuda†	74	13	47.1	3.40	
Brewton†	73	12	45.2	2.45	
Bridgeport†	.....	.....	.....	3.70	2.2
Citronelle†	72	18	48.4	3.32	
Clanton†	69	12	44.4	3.58	1.0
Cordova†	.....	.....	.....	5.23	2.0
Daphne†	73	14	46.2	2.16	T.
Decatur†	69	— 3	38.0	3.85	1.5
Elba†	76	14	47.4	2.10	
Eufaula *a*†	73	18	45.8	1.60	
Eufaula *c*†	.....	.....	.....	1.61	
Evergreen†	72	13	44.0	1.77	
Florence *a*†	.....	.....	.....	4.82	1.0
Florence *b*†	68	5	38.7	4.05	0.7
Fort Deposit †	78	13	43.8	1.37	1.5
Gadsden	67	3	39.7	5.14	2.0
Goodwater†	71	9	43.8	3.20	0.5
Greensboro†	72	12	41.6	5.74	
Hamilton	.....	.....	.....	5.51	0.7
Healing Springs†	83	10	45.3	4.46	
Highland Home†	72	14	45.8	.....	T.
Livingston	72	14	43.6	4.71	
Lock No. 4	70	8	39.9	4.69	1.0
Madison Station†	67	— 5	36.8	4.04	1.0
Marion†	71	12	42.5	4.13	1.0
Mount Willing†	.....	11	.....	2.33	
Newbern†	72	12	43.6	5.71	1.5
Newburg	68	— 5	38.4	3.69	1.0
Newton†	77	12	47.1	2.25	
Opelika†	72	10	44.0	1.25	
Oxanna†	68	7	38.7	3.67	1.4
Pineapple†	.....	.....	.....	1.23	1.5
Pushmataha†	72	15	43.8	5.49	1.0
Rockmills†	75	6	45.0	3.39	
Scottsboro†	69	— 4	37.8	4.71	2.5
Selma †	74	15	44.2	3.27	1.3
Talladega *¹	70	10	41.1	3.24	0.5
Tallassee †	.....	.....	.....	3.28	1.0
Thomasville	.....	.....	.....	3.35	2.0
Tuscaloosa†	74	11	40.9	4.43	0.5
Union†	73	10	44.0	5.18	
Union Springs†	73	10	42.8	4.33	1.0
Uniontown†	72	13	44.9	5.49	1.5
Valleyhead	64	— 7	37.2	5.29	2.0
Warrior†	.....	.....	.....	3.65	
Wetumpka	73	12	44.0	2.92	T.
Wilsonville†	.....	.....	.....	3.31	1.0
Arizona.					
Benson *§	71	30	46.4	2.10	
Bisbee†	60	22	41.9	2.50	8.0
Buckeye†	78	28	54.6	2.30	
Buttes	.....	.....	.....	4.40	
Calabasas	67	19	41.2	2.39	
Casa Grande*§	64	30	51.3	3.03	
Congress	67	33	47.8	6.66	T.
Dragoon†	.....	.....	.....	2.11	
Dragoon Summit*§	58	29	43.2	2.24	4.5
Dudleyville	67	19	46.6	1.96	
Eagle Pass*§	.....	12	31.3	2.95	5.5
Farleys Camp†	70	28	50.2	5.95	
Fort Apache	58	5	34.8	2.23	5.0
Fort Grant†	64	22	42.3	4.09	.....
Fort Huachuca†	69	15	42.2	3.68	15.0
Fort Mohave	73	35	51.8	2.92	
Gilabend *a*§	76	35	54.6	2.62	
Glendale	70	26	49.1	3.58	
Holbrook†	53	5	31.9	1.63	7.0
Ingleside	71	28	48.0	3.35	
Lochiel *¹	63	20	42.0	2.37	1.2
Maricopa*§	80	26	55.8	2.53	
Mesa†	78	27	53.8	3.66	
Mount Huachuca	63	20	40.6	3.45	2.2
Natural Bridge	.....	.....	.....	5.19	9.0
Oracle†	62	25	43.2	3.67	4.5
Oro	.....	.....	.....	1.58	
Oro Blanco	68	23	45.5	2.92	0.5
Pantano*§	60	29	40.3	1.07	6.0
Parker	74	27	52.2	3.64	
Payson	.....	.....	.....	7.75	9.5
Peoria†	67	30	50.2	4.01	
Phœnix	70	34	49.3	3.29	
Pinal Ranch	.....	.....	.....	8.30	7.5
Reymert †	70	29	52.7	5.42	
St. Helena Ranch	.....	.....	.....	3.80	5.0
San Carlos†	67	20	44.2	2.77	T.
San Simon*§	75	19	44.3	0.25	0.2
Showlow	.....	.....	.....	3.50	3.9
Signal†	71	29	48.6	3.63	
Sulphur Spring Valley†	.....	.....	.....	1.29	1.0
Texas Hill*§	73	40	53.5	0.90	
Tucson *c*†	71	26	49.6	1.79	
Walnut Grove	.....	.....	.....	0.74	
Walnut Ranch*†¹	62	16	39.4	3.31	12.0
Whipple Barracks†	58	5	33.7	4.62	19.2
Arizona—Cont'd.					
Willcox*§	60	26	40.4	1.47	
Arkansas.					
Amity	71	10	41.0	5.35	0.2
Arkansas City†	.....	.....	.....	6.45	
Beebranch†¹	65	6	38.6	6.70	0.5
Blackton	.....	.....	.....	11.12	1.5
Blanchard Springs†	71	8	42.8	7.22	3.0
Brinkley	67	12	39.8	8.91	
Camden *a*†	.....	.....	.....	7.83	1.0
Camden *b*†	73	9	39.8	7.76	2.5
Canton *¹	64	4	35.3	.....	1.0
Conway	70	10	42.6	6.25	
Corning†	65°	4°	32.8°	5.25	0.5
Dallas	71	5	39.6	4.27	1.7
Dardanelle	.....	.....	.....	4.40	T.
Elon†	75	1	44.0	7.09	3.5
Fayetteville†	68	0	35.4	5.20	3.2
Forrest	68	12	39.0	9.14	T.
Fulton	.....	.....	.....	7.14	1.0
Helena *a*†	.....	.....	.....	6.03	T.
Hot Springs *b*	.....	.....	.....	7.25	
Hot Springs (near)	.....	.....	.....	7.94	
Jonesboro	65°	6°	37.2°	7.51	
Keesees Ferry†	68	1	35.8	5.72	1.1
Lacrosse†¹	62	0	33.6	5.02	
Lonoke*¹	70	14	40.2	9.44	T.
Luna Landing*6	71	6	42.9	5.90	2.6
Lutherville *¹	72	6	38.6	.....	.....
Malvern†	71	1	39.4	5.99	T.
Marianna*¹	67	17	41.6	.....	.....
Marvell	70	13	41.1	6.68	
Moore	.....	.....	.....	14.72	1.0
Mossville	63	2	33.3	8.56	6.0
Mount Nebo†	66	0	36.1	4.04	3.0
New Gascony*¹	70s	16s	40.4s	9.36	1.0
Newport *a*†	.....	.....	.....	7.29	
Newport *b*†	63	8	36.6	7.17	
Newport *c*†	67	9	38.6	6.47	
Oregon*¹	62	0	31.2	.....	1.5
Osceola†	67	8	38.6	6.88	T.
Ozark†	70	6	39.4	3.69	0.7
Picayune†	70	11	43.1	3.57	T.
Pinebluff†	72	14	41.8	13.83	0.4
Pocahontas†	65	6	34.1	6.79	0.4
Prescott†	75	12	43.4	5.89	
Rison	71°	14°	40.8°	5.62	1.0
Russellville	62	8	37.8	3.95	3.8
Silver Springs †	67	— 2	32.3	6.16	3.2
Stuttgart†	69	14	40.3	9.25	T.
Texarkana†	76	10	42.4	5.93	.....
Warren †	73	14	43.4	8.00	1.0
Washington*†¹	70	12	42.3	7.66	0.2
Wiggs *¹	69	10	41.5	7.07	0.9
Winslow	.....	.....	.....	4.13	4.5
Witts Springs †¹	63	0	34.6	4.77	1.0
California.					
Adin	55	4	31.3	1.24	4.0
Agnew	62	30	47.4	1.65	
Arlington Heights	75	35	52.6	2.75	
Athlone*§	59	28	43.0	2.16	
Azusa	.....	.....	.....	5.43	.....
Barstow†	58	25	41.3	2.15	0.5
Bear Valley†	.....	.....	.....	4.18	19.0
Berkeley	57	38	46.1	3.71	
Bishop†	67	16	38.3	0.32	T.
Bishop Creek*§	65	30	39.1	0.03	
Boca*§	63	0	27.8	2.20	22.0
Bodie†	43	—14	19.5	1.69	13.0
Bowmans Dam†	.....	.....	.....	4.88	41.0
Caliente*§	69	35	49.9	1.25	
Calloway Canal†	.....	.....	.....	1.59	
Castle Pinckney*¹	72	42	53.7	3.88	
Cedarville†	53	15	32.6	0.31	3.0
Centerville*¹	64	38	50.8	2.08	
Chico*§	62	35	47.3	3.89	
Chino*†§	71	33	49.3	5.30	
Cisco*§	47	15	30.2	.....	39.0
Claremont†	72	32	49.6	4.18	
Corning*§	63	32	44.9	2.93	
Coronado	82	47	62.8	3.13	
Craftonville	68	30	48.8	4.72	
Crescent City†	59	33	47.3	3.53	
Daunt	.....	.....	.....	5.70	
Davisville *b*	77	32	49.3	3.51	
Delano*§	60	33	45.3	1.35	
Delta*§	58	25	41.6	4.66	
Descanso*§	65	28	46.4	6.48	1.4
Drytown	68	25	44.0	5.11	
Dunnigan*§	58	32	45.4	3.90	
Durham*¹	52	34	43.2	3.65	
Edgwood*§	56	17	36.6	1.18	4.0
Escondido	75	23	49.2	.....	
Fallbrook*¹	76	38	51.8	4.20	
Famosa†	58	33	44.0	1.57	
Folsom City *b*¹	60	32	45.6	4.57	
Fordyce Dam †	.....	.....	.....	4.20	41.0
California—Cont'd.					
Fort Bragg†	.....	.....	.....	2.66	
Fort Ross	.....	.....	.....	4.74	
Fort Tejon	.....	.....	.....	3.52	14.0
Georgetown†	64	24	43.9	4.83	2.0
Glendora	.....	.....	.....	5.41	
Goshen*§	62	30	44.2	2.64	
Grand Island*§	59	36	46.0	4.14	
Grass Valley	.....	.....	.....	5.30	T.
Greenville†	57	8	34.8	2.57	9.5
Guinda	.....	.....	.....	4.95	
Healdsburg *¹	58	32	42.4	5.07	
Hollister	66	24	46.4	1.06	
Hueneme	.....	.....	.....	3.58	
Hydesville	65	28	46.8	2.96	
Indio*§	77	35	53.1	1.10	
Iowa Hill*¹	67	27	43.1	3.44	
Jolon	.....	.....	.....	4.61	
Keeler*§	65	34	44.8	0.10	
Keene*§	65	26	44.5	2.28	
Kennedy Gold Mine	62	29	44.1	6.00	
Kernville	.....	.....	.....	3.40	
King City*§	74	32	52.1	2.07	
Kingsburg*§	55	30	44.4	1.64	
Kono Tayee	55	34	43.4	2.85	
Lagrange*§	60	32	45.2	2.30	
Laporte*†¹	55	14	33.6	6.04	45.0
Las Fuentes Ranch	.....	.....	.....	2.68	
Lemoore *a*§	59	29	44.6	0.63	
Lick Observatory†	59	26	41.6	3.50	2.0
Lime Kiln	64	30	46.3	.....	
Lodi	55	31	44.6	3.41	
Los Alamos†	.....	.....	.....	3.52	
Los Gatos *b*	58	34	45.7	3.07	
Lytton Springs	62	32	47.3	4.65	
McMullin*¹	58	30	42.8	.....	
Malakoff Mine*¹	68	27	42.0	5.06	0.5
Mammoth Tank*§	74	38	55.2	T.	
Manzana	54	21	37.5	2.70	12.0
Merced*§	59	32	45.0	2.49	
Middletown*†¹	65	28	41.7	4.21	
Mills College	.....	.....	.....	3.43	
Milton (near)*¹	58	32	47.7	3.22	
Modesto*§	70	31	47.8	1.19	
Mohave*§	64	30	43.8	1.86	0.5
Mokelumne Hill*§	.....	32	43.2	5.92	
Morena Dam*4	67	25	40.6	4.44	T.
Mount Breckenridge	.....	.....	.....	2.00	7.0
Mount Frazier	.....	.....	.....	7.37	87.0
Mount Glenwood*¹	58	31	44.4	6.59	
Mutah Flat†	.....	.....	.....	9.10	41.0
Napa *b*	61	31	46.2	2.29	
Needles	75	37	55.0	2.34	
Nevada City†	64	24	41.2	4.38	
Newcastle *a*†	53	30	41.6	4.68	
Newhall*§	73	27	48.2	4.86	
Nordhoff †	82	26	49.4	4.11	
North Ontario	70	35	50.3	5.26	
North San Juan*¹	72	25	47.2	4.20	
Oakland *a*	58	34	46.4	3.32	
Ogilby*§	78	38	58.7	1.00	
Oleta*¹	60	29	42.1	5.49	
Orangevale†	58	30	43.8	4.50	
Orland*§	65	30	46.8	3.58	
Oroville *b*	62	40	48.6	4.20	
Otay Dam*¹	78	38	56.8	3.21	
Palermo†	60	32	44.3	3.35	
Paso Robles *b*	64	28	46.0	3.65	
Peachland*¹	60	30	45.3	5.60	
Pilot Creek	.....	.....	.....	5.63	8.5
Placerville	58	23	40.4	4.68	
Point Lobos	57	40	47.6	2.91	
Pomona (near)	76	31	52.3	5.54	
Poway*§	76	29	46.6	4.30	
Quincy†	50	15	34.0	2.77	8.5
Ravenna*§	69	33	47.7	3.50	
Redding *b*†	67	29	45.6	4.42	
Reedley (near)*¹	60	32	46.0	3.04	
Represa	62	30	44.3	4.38	
Riovista	58	31	44.3	2.49	
Roseville (near)*§	52	26	39.8	3.63	
Rosewood	65	24	42.6	4.49	
Sacramento *a*	61	32	45.2	4.20	
Salinas*§	55	36	44.7	0.55	
Salton*§	74	40	54.0	1.17	
San Bernardino†	75	30	50.8	3.40	
San Jacinto	71	26	48.1	3.55	
San Jose *b*	60	26	44.9	1.68	
San Leandro*¹	76	39	52.4	3.13	
San Mateo*§	59	37	49.7	2.02	
San Miguel*§	63	27	46.2	1.14	
Santa Ana*§	78	36	56.6	2.19	
Santa Barbara *a*	78	40	54.6	4.35	
Santa Clara *a*	.....	.....	.....	1.20	
Santa Cruz *b*†	71	30	50.0	3.72	
Santa Maria	76	35	53.8	3.55	
Santa Monica*§	75	41	62.6	4.30	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Santa Paula *b*†	73	33	50.0	5.31	
Santa Rosa*[8]	60	33	48.0	2.27	
Saticoy	.....	.....	.....	4.80	
Shasta	.....	.....	.....	6.95	
Sierra Madre	72	39	53.2	4.48	
Sneddens Ranch†	.....	.....	.....	8.30	42.0
S. E. Farallone L. H.	.....	.....	.....	3.04	
Stanford University	62	32	45.8	1.84	
Stockton *a*	56	31	43.2	1.81	
Summerdale†	58	15	35.3	4.42	24.0
Susanville†	58	14	35.0	5.99	11.0
Sutter Creek*[5]	56	24	38.4	2.36	
Tecarte Dam*[4]	71	22	42.2	4.95	
Tehama*[8]	57	34	46.4	2.53	
Templeton*[8]	65	30	46.4	2.68	
Truckee*[8]	50	— 8	25.9	.....	23.5
Tulare *b*	.....	.....	.....	2.66	
Tulare *c*	74	26	46.8	2.40	
Turlock *b*†	57	28	42.3	1.93	
Ukiah†	60	27	45.0	4.25	
Upper Mattole*[1]	78	32	49.9	6.88	
Vacaville *a*[1]	60	32	45.2	6.36	
Ventura†	79	33	52.0	4.07	
Volcano Springs*[5]	83	31	59.8	0.00	
Walnutcreek	60	32	44.8	3.45	
West Palmdale	.....	.....	.....	3.78	30.0
Westpoint†	.....	.....	.....	5.41	
Wheatland†	59	30	43.2	3.13	
Williams*[8]	63	33	45.9	2.90	
Wilmington*[5]	78	37	60.0	.....	
Wire Bridge*[5]	62	28	45.1	2.20	
Yreka†	54	18	35.6	0.42	T.
Yuba City*[8]	58	37	48.6	4.94	
Engineers Quarters‡	.....	.....	.....	5.16	30.5
Morses House‡	.....	.....	.....	9.34	37.0
Deep Creek‡	.....	.....	.....	5.43	34.0
Holcomb Creek‡	.....	.....	.....	3.35	23.0
Squirrel Inn‡	.....	.....	.....	7.65	32.0
Colorado.					
Alma†	41[c]	— 9[c]	15.4[c]	0.81	2.5
Antlers†	43	— 2	23.6	1.12	11.6
Arkins	.....	.....	.....	0.18	2.2
Boxelder	.....	.....	.....	0.18	.....
Breckenridge†	52	—28	13.4	2.90	29.0
Canyon†	59[b]	—15[b]	30.1[b]	0.08	2.0
Castlerock†	47	—21	22.0	0.47	4.7
Collbran	.....	.....	.....	1.60	16.0
Colorado Springs†	58	—18	25.4	0.10	1.8
Cope†	60	—13	26.6	0.38	4.0
Cripple Creek†	67	—10	24.8	0.61	6.2
Delta	45	— 6	22.9	0.49	3.5
Downing†	57	— 9	23.6	1.10	11.0
Dumont†	50	—10	24.6	0.45	4.5
Fleming	.....	.....	.....	0.61	6.5
Fort Collins†	64	—26	24.8	0.18	2.2
Fox	.....	.....	.....	0.30	3.0
Garnett	.....	.....	.....	0.26	3.0
Gleneyrie†	56	—14	26.4	0.39	6.0
Grand Junction†	47	9	29.8	1.00	5.5
Greeley†	60	—23	23.0	0.06	.....
Gulch†	42	— 5	22.0	0.71	12.0
Gunnison†	43	—23	10.5	0.60	6.0
Holly	.....	.....	.....	0.17	1.0
Hugo (near)	60	—20	23.6	0.14	2.5
Husted†	62	—24	26.8	0.43	6.8
La Jara	40	—28	9.4	0.40	4.0
Lake Moraine†	48	—31	19.2	1.22	15.0
Lamar†	60	—13	29.0	0.06	1.5
Laporte	.....	.....	.....	0.20	2.0
Las Animas†	60	—20	28.4	0.45	3.5
Lay†	43	—32	15.2	0.77	7.2
Leadville (near)*†	45	—10	17.4	0.32	7.5
Leroy†	55	—17	24.6	0.60	6.0
Longmont†	61	—20	25.3	0.23	2.5
Longs Peak	54	—14	.....	0.78	7.8
Loveland	.....	.....	.....	0.15	1.5
Meeker†	46	—28	16.8	1.38	18.0
Millbrook†	59	—14	23.2	0.45	5.0
Minneapolis†	67	—13	30.3	0.20	2.0
Montrose†	49	— 3	25.0	0.62	6.2
Moraine†	46	—13	24.0	0.61	8.5
Pagoda†	47	—28	16.8	1.70	17.0
Paonia†	.....	.....	.....	0.85	8.5
Parachute†	46	—12	20.8	1.52	15.2
Pinkhamton*[5]	50	—17	18.2	1.50	15.0
Rangely†	44	—19	13.0	0.41	5.8
Redcliff	.....	.....	.....	1.24	12.4
Rico†	45	—11	20.7	3.26	33.0
Rockyford†	54	—15	25.9	0.75	5.0
Ruby	.....	.....	.....	8.60	86.0
Saguache†	38	—12	15.4	0.30	3.0
St. Cloud	.....	.....	.....	0.10	1.0
San Luis†	43	—24	13.4	0.47	5.0
Santa Clara*[1]	48	—15	21.2	3.90	39.0
Seibert†	.....	.....	.....	0.10	1.0
Sherwood Ranch	47	—18	16.4	1.00	10.0
Colorado—Cont'd.					
Smoky Hill Mine†	64	—17	22.6	0.40	4.0
Stamford*[1]	56	—16	17.6	1.25	12.5
Steamboat Springs†	46	—29	16.4	2.13	22.5
Sulphur Springs†	55	—27	14.9	0.85	13.0
Surface Creek†	58	— 2	27.0	0.95	5.5
Thon†	59	—19	28.2	0.17	4.0
T. S. Ranch†	44	2	24.8	1.32	6.7
Twin Lakes	.....	.....	.....	0.79	9.5
Vilas	.....	.....	.....	0.20	2.0
Walden	44	—21	13.9	0.56	6.5
Wallet†	.....	.....	.....	0.20	2.0
Wray†	64	—14	26.8	0.28	3.5
Yuma	.....	.....	.....	0.37	3.8
Connecticut.					
Bridgeport	53	6	28.4	3.93	18.4
Canton†	52	— 6	25.2	3.44	20.0
Colchester	54	2	26.6	5.85	26.5
Falls Village	.....	.....	.....	3.25	20.5
Greenfield Hill	.....	.....	.....	4.40	18.9
Hartford *b*	.....	.....	.....	4.05	27.0
Hartford *c*	51	3	27.2	.....	27.5
Lake Konomoc	.....	.....	.....	3.55	.....
Middletown	56	— 3	27.5	5.68	33.0
New London†	50	5	28.0	4.28	27.3
North Grosvenor Dale	50	1	26.0	4.92	.....
Norwalk	51	2	27.2	3.90	14.0
Southington*[1]	51	— 1	26.2	4.68	22.5
South Manchester	.....	.....	.....	4.82	27.0
Storrs	53	— 2	24.4	3.84	.....
Voluntown†	56	— 1	27.3	5.05	17.5
Wallingford†	.....	.....	.....	4.76	21.0
Waterbury	52	3	27.8	4.58	23.0
West Cornwall†	50	— 1	23.8	3.54	24.8
West Simsbury	.....	.....	.....	4.42	25.0
Windsor	51	— 5	25.5	4.97	30.5
Delaware.					
Milford	63	9	33.0	0.81	7.8
Millsboro	64	3	33.0	2.60	13.0
Newark	56	6	28.6	2.35	8.0
Seaford†	63	8	32.2	2.16	12.5
District of Columbia.					
Distributing Reservoir*[5]	63	9	30.3	1.11	.....
Receiving Reservoir*[5]	63	8	30.0	1.16	.....
West Washington	64	6	30.2	1.77	7.3
Florida.					
Amelia†	71	23	47.8	2.32	
Archer†	78	22	52.7	2.05	
Bartow	80	28	57.6	1.15	
Brooksville†	77	24	55.5	1.67	
Clermont†	84	26	56.7	1.52	
De Funiak Springs	75	17	48.2	2.10	T.
Earnestville†	79	25	56.6	1.60	
Emerson†	78	18	50.4	0.79	
Eustis†	79	25	55.6	2.53	
Federal Point†	76	24	53.0	3.63	
Fort Meade†	78	26	56.4	1.31	
Frostproof†	81	30	59.0	1.26	
Grasmere†	78	25	55.8	1.48	
Huntington	78	26	54.4	1.66	
Lake Butler†	76	21	50.6	1.49	
Lake City†	75	20	52.4	1.27	
Lemon City†	80	38	65.5	4.70	
Macclenny†	76	21	50.8	1.28	
Manatee†	80	26	56.6	3.05	
Merritts Island†	77	29	59.2	1.67	
Milton*[1]	74	20	48.4	2.14	
Mullet Key†	72	32	57.4	2.12	
Myers†	78	33	61.2	2.26	
New Smyrna†	76	26	54.9	2.19	
Oakhill*[1]	77	30	58.8	.....	
Ocala*†	76	24	53.7	2.11	
Orange City	77	25	55.6	1.58	
Orange Park	78	22	52.3	1.73	
Orlando†	76	25	55.0	1.16	T.
Oxford*†	78	25	54.9	2.00	
Plant City†	81	27	57.5	0.87	
St. Francis†	79	30	53.8	2.04	
St. Francis Barracks	75	22	52.0	1.57	
Tallahassee†	73	19	48.8	1.42	
Tarpon Springs†	79	28	55.4	1.33	
Georgia.					
Adairsville†	64	— 1	36.4	4.39	2.0
Albany†	.....	.....	.....	1.00	
Allentown†	70	12	44.4	1.92	
Americus†	71	11	45.2	2.03	
Athens *b*	68	7	40.0	.....	
Blakely*†	74	16	48.4	2.03	
Brag†	77	12	46.8	2.06	
Canton†	.....	.....	.....	5.29	2.0
Cedartown	66	2	36.6	4.31	1.5
Clayton†	60	1	36.5	5.05	3.0
Columbus	70	14	43.6	1.63	
Covington	67	6	38.9	2.51	T.
Dahlonega†	62	0	38.0	5.77	2.0
Diamond†	60	0	34.3	4.89	5.0
Dublin	.....	.....	.....	1.13	
Georgia—Cont'd.					
Elberton†	66	8	41.1	4.06	T.
Fleming†	74	17	42.2	1.36	
Fort Gaines	72	15	45.3	1.76	
Gainesville	60	6	37.0	4.40	T.
Gillsville†	72	7	39.6	4.26	
Hawkinsville	72	4	42.4	5.84	
Hephzibah†	.....	.....	.....	2.30	T.
Jesup	74	18	50.2	1.03	
Lagrange†	.....	.....	.....	2.72	.....
Louisville†	72	9	44.6	2.28	
Macon† *b*	.....	.....	.....	1.95	T.
Marietta	64	5	38.5	4.02	T.
Marshallville†	70	14	45.5	1.93	T.
Milledgeville†	71	11	43.8	1.60	T.
Millen[k]	64	12	42.0	1.82	
Monticello*†[1]	62	11	41.9	2.00	
Morgan†	77	13	45.2	1.76	
Newnan†	66	7	39.0	3.17	.....
Pisco la	75	18	49.4	1.50	
Poulan†	76	16	46.5	0.56	
Quitman†	77	17	48.8	1.60	
Ramsey	67	0	39.7	2.17	2.0
Resaca†	.....	.....	.....	3.98	2.0
Reynolds	.....	.....	.....	1.37	
Rome†	65	3	38.0	5.43	2.0
Sparta	.....	.....	.....	1.74	
Talbotton†	69	10	42.3	.....	T.
Tallapoosa	65	— 6	38.0	3.53	
Thomasville†	76	17	49.5	1.16	
Toccoa†	61	6	38.3	4.71	0.2
Washington†	.....	.....	.....	3.10	
Idaho.					
American Falls	55	— 8	24.1	0.53	.....
Blackfoot†	49	—23	22.2	0.17	1.7
Boise Barracks†	50	5	29.9	1.15	3.1
Burnside†	49	—15	20.4	0.37	.....
Chesterfield†	49	—21	18.0	0.66	6.0
Cœur d'Alene	49	1	29.0	.....	.....
Corral*†	40	— 9	17.3	0.70	7.0
Fort Sherman†	46	0	28.7	2.82	7.7
Gimlet†	47	—14	19.8	0.28	4.2
Idaho City	47[d]	5[d]	25.0[d]	1.98	19.8
Kootenai†	45	— 5	25.6	1.40	14.0
Lake†	32	—30	11.2	0.30	3.0
Lewiston *a*†	52	0	34.2	0.48	1.2
Lost River†	.....	.....	.....	0.05	2.0
Martin†	43	—18	17.4	0.00	0.0
Minidoka†	50	—10	25.0	0.60	6.0
Moscow†	48[g]	—12[g]	23.5[h]	1.01	.....
Murray†	46	— 5	25.8	2.31	21.0
Oakley	53	— 9	27.5	0.50	5.0
Ola†	46	— 9	25.9	1.88	12.6
Paris†	55	—18	18.9	0.36	3.6
Payette†	50	— 1	29.4	1.60	13.5
Pollock†	58	— 3	32.3	0.45	4.5
Rexburg†	39	—39	21.3	0.71	7.1
Roseberry†	44	—22	15.6	0.58	5.0
Salubria†	45	— 7	24.8	1.74	17.4
Shoup	54	— 9	17.4	0.20	T.
Soldier†	45	—15	16.2	0.43	4.0
Swan Valley†	45	—19	16.9	0.98	9.4
Warren†	40	—30	18.6	0.72	.....
Yellowjacket†	.....	.....	.....	0.55	.....
Illinois.					
Albion†	64	— 5	30.7	3.73	.....
Alexander†	62	—10	25.6	6.05	16.5
Ashton*†	58	—26	18.7	4.15	9.2
Atlanta	.....	.....	.....	5.52	11.0
Atwood *a**†	60	—14	20.8	6.92	10.0
Aurora *a*	58	—22	22.3	6.02	9.0
Aurora *b*†	59	—22	20.3	6.93	13.5
Beardstown†	.....	.....	.....	5.32	4.0
Bloomington†	60	—19	23.0	5.41	10.8
Bushnell†	69	—17	23.8	5.20	4.8
Cambridge†	61	—17	21.3	4.90	11.0
Carlinville†	62	— 7	27.8	3.91	8.0
Carlyle	.....	.....	.....	4.04	6.5
Carrollton	64	— 8	26.2	4.99	11.6
Catlin	67	— 7	21.4	3.70	9.0
Charleston	62	—12	25.2	4.47	6.6
Chemung*[1]	59	—24	18.6	5.06	11.0
Chester	.....	.....	.....	4.13	1.0
Cisne*†[1]	65	— 3	29.2	3.82	2.0
Clearcreek†	61	—19	20.9	5.47	7.0
Coatsburg†	62	—14	24.4	6.70	7.6
Cobden†	64	— 2	32.6	4.47	2.5
Decatur†	62	—13	25.0	3.83	8.1
Dixon†	61	—21	19.7	3.00	9.2
Duquoin*[1]	62	— 2	31.0	3.05	1.5
Dwight†	68	—20	20.7	5.34	3.7
East Peoria†	65	—16	22.8	.....	.....
Effingham†	64	6	27.6	4.70	8.7
Evanston*[10]	56	—24	20.2	.....	.....
Fort Sheridan†	59	—21	21.6	4.41	6.2
Friendgrove*†[4]	.....	— 2	31.3	3.62	3.1
Galva†	62	—19	20.7	4.91	11.0

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Illinois—Cont'd.	°	°	°	*Ins.*	*Ins.*
Glenwood *†	55	−29	17.7	2.93	5.5
Golconda †	67	− 2	32.8	4.49	.....
Grafton †	.....	.....	.....	2.87	3.5
Greenville †	64	− 7	27.7	4.97	13.3
Griggsville †	68	−10	26.4	6.74	9.8
Halliday *§	64e	1e	32.1e	3.31	2.0
Havana †	63	−13	25.9	6.66	12.0
Herrin *‡	66	− 2	33.7	2.83	4.0
Hillsboro †	68	− 7	27.0	4.02	5.5
Iron †	65	− 3	30.6	4.05	1.0
Joliet †	61	−20	24.2	6.67	12.9
Jordans Grove †	65	− 3	31.3	3.16	3.2
Kankakee a †	64	−18	22.0	3.23	...
Kishwaukee	59	−24	18.4	3.71	8.0
Knoxville a *§	65	−21	21.4	6.32	9.2
Lagrange †	58	−30	21.5	6.09	10.2
Laharpe *‡	64	−18	22.8	10.38	7.2
Lanark *†	59	−23	18.4	2.48	.....
Lexington	.....	−17	.....	5.67	9.0
Loami †	.....	.....	.....	5.90	8.0
Louisville †	65	− 7	28.3	3.93	6.0
McLeansboro †	66	− 4	31.0	4.23	1.0
Martinsville †	62	− 8	26.8	4.15	9.0
Martinton †	59	−20	22.1	3.61	5.5
Mascoutah *§	64	− 2	31.0	4.71	5.1
Mattoon *‡	54	− 5	27.6	4.05	3.2
Minonk †	61	−16	22.6	5.14	9.5
Monmouth †	63	−19	21.6	5.14	8.2
Morrisonville †	62	− 8	27.4	3.35	4.2
Mount Carmel †	.....	.....	.....	4.52	6.1
Mount Pulaski	60	−14	25.1	5.19	13.5
Mount Vernon	70	− 2	29.2	3.57	1.5
New Burnside †	65	− 6	32.6	2.70	2.0
Olney a *‡	64	− 5	30.2	3.77	7.1
Oregon †	59	−28	18.6	3.76	.....
Oswego *‡	59	−24	18.7	6.06	10.5
Ottawa †	62	−21	21.4	5.98	9.5
Palestine †	65	− 6	28.6	3.38	9.5
Peoria a †	.....	.....	.....	7.54	8.0
Peoria b †	63	−16	24.4	5.39	9.0
Philo †	62	−15	22.6	4.25	10.0
Plumhill †	65	− 1	29.4	3.86	6.5
Rantoul †	60	−16	23.0	3.88	11.8
Reynolds	63	−20	20.3	3.54	7.6
Riley †	56	−34	18.7	4.45	8.6
Robinson *†§	65	− 8	25.2	4.08	8.3
Rockford †	57	−23	19.4	4.72	15.0
Rose Hill *†	64	− 6	30.0	4.45	7.5
Roundgrove †	65	−21	21.2	2.91	.....
St. Charles *†	58	−22	20.9	6.04	10.8
St. John *†	62	− 1	29.6	3.17	T.
Scales Mound	60	−24	17.9	1.96	11.2
Streator †	60	−18	20.6	5.65	10.5
Sycamore †	57	−23	19.4	4.64	6.9
Tiskilwa *†§	58	−20	18.8	5.81	10.0
Tuscola †	63	−12	24.6	4.39	6.0
Walnut †	62	−21	22.4	5.01	5.7
Wheaton *§	.....	−20	19.2	6.61	16.5
Winnebago †	59	−23	18.9	3.74	13.0
Zion †	59	−26	18.8	2.22	.....
Indiana.					
Anderson †	62	−18	24.4	2.78	10.2
Angola *‡	56	−20	22.9	4.30	17.3
Auburn †	59	−19	22.4	2.86	.....
Bloomington †	64	− 7	27.4	3.17	9.5
Bluffton †	58	−21	22.0	2.74	9.5
Bright †	64	−12	27.6	2.97	11.1
Butlerville †	65	− 9	28.2	3.08	8.6
Cambridge City †	63	−15	24.6	2.69	7.6
Columbia City *‡	58	−20	21.9	3.78	13.0
Columbus †	65	−11	27.1	2.74	7.6
Connersville †	62	−14	24.4	2.46	5.8
Delphi †	64	−18	23.1	3.79	9.0
Edwardsville *†	65	− 6	30.6	3.22	3.8
Evansville †	62	− 1	30.2	3.16	1.2
Farmland †	61	−13	24.6	1.99	10.3
Franklin *‡	63	−10	26.1	2.93	11.0
Greencastle †	63	−14	25.3	3.96	9.3
Greensburg	67	−11	26.9	1.73	3.6
Hammond †	58	−20	21.4	5.58	14.0
Huntington	61	−18	22.4	3.27	16.5
Jasper †	65	− 4	31.2	2.65	4.0
Jeffersonville	67	− 2	31.6	3.08	2.5
Knightstown †	62	−15	24.6	3.10	12.1
Kokomo †	61	−16	24.9	4.66	9.2
Laconia	66	− 4	30.0	2.95	3.0
Lafayette †	64	−22	23.6	3.29	10.0
Logansport b †	65	−18	22.6	4.10	7.0
Madison †	66	− 5	30.5	3.15	7.5
Marengo †	66	− 5	31.4	4.07	5.6
Marion †	61	−20	23.4	2.78	12.2
Mauzy †	60	−15	24.7	3.24	12.6
Mount Vernon †	65	− 2	31.0	2.80	1.5
Northfield †	59	−16	22.4	3.95	12.0
Princeton *†	65	− 4	29.5	.....	6.0
Richmond	63	−14	24.0	2.13	2.5

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Indiana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Rockville †	63	−15	24.9	4.10	11.0
Salem	65	− 8	29.2	2.75	5.0
Scottsburg	66	− 6	29.2	2.39	4.5
Seymour †	64	− 8	26.2	2.80	11.0
Shelbyville	60	−10	21.5	3.29	.....
South Bend †	58	−22	21.5	5.53	21.5
Sunman	60	−13	25.2	3.00	11.0
Syracuse †	.....	.....	.....	4.56	14.0
Terre Haute †	63	−10	27.7	4.09	5.5
Tipton †	.....	.....	.....	2.08	7.8
Topeka †	56	−18	22.9	3.91	9.7
Valparaiso †	58	−21	24.3	5.97	11.5
Vevay	68	− 7	29.4	2.80	11.0
Vincennes †	65	− 3	29.2	2.69	4.0
Warsaw †	58	−20	22.6	4.54	7.0
Washington †	65	− 4	30.9	3.21	.....
Worthington †	63	− 7	27.9	3.84	10.2
Indian Territory.					
Healdton †	68	6	37.4	2.67	4.0
Lehigh †	66	6	37.3	6.00	4.8
Purcell	.....	.....	.....	1.32	6.0
South McAlester	66	4	34.8	4.12	13.0
Tahlequah	70	1	38.0	6.83	1.0
Tulsa †	.....	.....	.....	0.97	0.7
Wagoner	68	1	35.1	3.26	3.0
Iowa.					
Adair	.....	.....	.....	1.46	2.0
Afton	57	−16	19.6	1.15	8.0
Algona *‡	52	−27	12.2	1.38	10.0
Alta a †	46	−24	11.4	1.62	13.2
Amana †	60	−20	17.0	2.47	7.8
Ames b ‡	55e	−20	16.7	1.29	3.3
Atlantic †	54	−15	14.1	0.88	7.0
Atlantic (near)	53	−16	17.9	1.42	8.5
Audubon	53	−20	17.3	0.80	6.0
Belknap	63	−17	19.8	4.20	12.0
Belleplaine	58	−22	16.6	1.53	9.8
Bonaparte †	65	−16	21.8	4.42	4.0
Britt	52	−24	11.5	1.67	2.9
Carroll	55	−22	15.0	2.24	11.0
Cedar Rapids †	63	−21	17.1	1.99	7.9
Centerville	68	−17	24.2	1.22	5.5
Chariton	60	−14	20.8	1.49	3.8
Charles City †	58	−27	12.4	1.58	11.8
Clarinda †	59	−12	21.7	1.31	8.5
Clinton	62	−21	20.4	3.27	6.0
College Springs	66	−12	23.5	0.52	5.9
Corning †	61	−16	20.2	0.85	8.5
Council Bluffs	.....	.....	.....	0.54	4.2
Cresco †	54	−29	11.2	1.96	5.8
Decorah †	57	−27	13.6	2.23	5.5
Delaware *§	59	−24	14.1	2.28	6.2
Denison †	54	−18	18.3	0.75	7.5
Dows	65	−25	14.7	1.65	8.5
Elkader †	64	−30	14.2	2.31	12.8
Estherville	45	−26	11.4	1.20	9.0
Fairfield †	60	−17	19.7	3.09	3.5
Fayette †	60	−24	14.6	2.73	11.4
Fonda	56	−23	15.7	.....	.....
Forest City	54	−25	10.4	1.58	11.0
Fort Madison *†	62	−12	25.5	6.16	9.6
Galva †	47	−22	13.6	1.45	13.3
Gardengrove	60	−18	18.3	2.15	8.0
Glenwood †	52	−15	18.6	0.77	6.0
Grand Meadow *‡	56	−25	13.5	2.96	12.5
Greenfield †	57	−17	18.6	1.53	7.4
Grinnell †	59	−20	16.9	1.98	3.5
Grundy Center	60	−23	14.6	1.01	4.0
Hampton	56	−23	12.4	1.99	9.0
Hopeville †	59	−16	19.3	1.23	.....
Humboldt †	53	−23	15.1	1.55	13.0
Independence †	57	−24	14.2	1.08	10.8
Indianola †	61	−18	21.1	3.43	11.2
Iowa City a †	64	−20	18.1	3.66	12.0
Iowa City b	62	−18	20.2	.....	.....
Iowa Falls †	57	−26	13.8	1.95	10.0
Keosauqua	64	−14	23.2	5.60	4.0
Knoxville	61	−17	20.4	1.10	6.0
Lansing	61	−25	17.3	2.82	6.5
Larchwood	.....	.....	.....	2.24	20.8
Larrabee †	49	−25	15.0	1.68	14.2
Lemars	46	−19	13.8	2.60	7.0
Lenox *‡	59	−12	21.2	1.00	6.5
Logan †	48	−15	18.6	1.62	7.0
Madrid	66	−28	20.4	1.06	4.0
Malvern *‡	54	−15	19.3	0.79	6.8
Maquoketa	62	−21	18.9	2.65	8.0
Marshall †	62	−20	16.6	1.76	.....
Mason City † c	54	−20	16.1	4.60	2.4
Millman	.....	.....	.....	1.24	6.5
Monticello *†	59	−21	17.4	2.35	6.1
Mooar	64	−15	20.2	3.81	.....
Mountayr †	57	−15	20.5	1.66	8.5
Mount Pleasant *‡	64	−17	21.2	3.52	5.0
Mount Vernon a *‡	64	−26	16.5	2.37	.....
Mount Vernon b	60	−20	16.6	2.22	8.8

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Iowa—Cont'd.	°	°	°	*Ins.*	*Ins.*
Neola	50	−16	17.0	0.45	2.0
Newton †	60	−20	17.6	2.39	15.0
Northwood	52	−29	10.2	1.50	10.0
Ogden	59	−20	18.6	1.18	7.8
Osage *†§	.....	−25	10.4	1.89	8.8
Osceola	61	−17	18.4	1.63	7.5
Oskaloosa †	63	−18	20.1	1.19	10.0
Ottumwa	64	−18	20.8	3.52	6.0
Ovid †	63	−15	19.8	1.71	10.0
Plover	.....	.....	.....	0.90	6.0
Portsmouth	60	−16	20.9	0.15	0.5
Primghar	45	−24	12.8	1.55	9.0
Rock Rapids	50	−30	13.2	1.05	10.5
Sac City †	50	−21	11.6	1.32	10.8
St. Charles	58	−17	18.4	1.98	11.3
Scranton	45	−19	15.2	2.00	7.0
Seymour †	62	−15	21.8	1.95	5.0
Sibley	.....	.....	.....	1.84	14.5
Sidney	54	−13	21.0	0.85	7.0
Sigourney	62	−19	18.5	2.16	9.5
Spencer	45	−25	11.2	1.28	9.2
Spirit Lake †	41	−27	10.6	1.09	10.9
Stuart	60	−18	18.2	1.10	6.0
Toledo	59	−22	16.0	1.36	4.0
Villisca †	57	−13	20.7	1.09	6.5
Vinton *‡	62	−20	17.0	1.74	6.0
Washington	.....	−20	.....	3.51	7.8
Waterloo	61	−22	16.0	1.78	7.4
Waverly	59	−23	14.5	2.28	12.1
Webster City	56	−21	15.4	1.24	5.2
Westbend *†	51	−25	12.0	1.66	12.0
Wilton Junction †	63	−20	19.4	3.18	13.0
Winterset †	60	−18	18.3	1.68	9.5
Kansas.					
Abilene †	58	− 4	28.0	0.90	6.0
Achilles *§	69e	−13	19.7e	0.05	0.5
Altoona *†§	60	− 4	27.8	1.46	5.5
Anthony	.....	.....	.....	0.57	0.5
Assaria *§	54	− 5	25.9	0.99	8.8
Atchison †	64	− 8	24.8	1.21	8.4
Augusta	57	− 1	29.6	1.05	3.8
Beloit †	55	− 2	28.2	0.53	4.1
Blaine	54	−16	24.2	1.27	9.2
Campbell	53	− 9	25.4	1.02	12.6
Colby †	62	−13	25.6	0.22	T.
Columbus †	68	− 3	29.9	5.46	7.4
Coolidge †	58	−10	27.9	0.10	1.0
Cunningham †	59	− 6	29.4	0.65	5.8
Delphos *‡	54	− 6	25.6	0.93	6.8
Downs	.....	.....	.....	0.85	8.5
Dresden *§	65	− 7	28.7	0.16	1.5
Effingham	58	− 8	26.6	.....	5.0
Elgin *‡	62	− 2	29.6	1.10	4.6
Ellinwood †	59	− 4	27.9	1.01	11.1
Emporia *†‡	59	− 3	29.9	1.25	5.0
Englewood †	62	− 1	27.8	1.18	14.0
Eureka †	.....	.....	.....	1.48	6.0
Eureka Ranch †	58	−10	27.0	0.69	6.0
Fall River	67	− 4	32.2	1.81	5.2
Fort Riley †	60	− 6	28.4	0.99	5.4
Fort Scott †.	65	− 1	29.4	4.77	8.0
Frankfort	62	− 6	29.2	0.45	4.5
Garfield	.....	.....	.....	0.69	9.1
Gibson *§	61	− 5	27.4	0.60	6.0
Goodland	63	−16	29.2	T.	T.
Gove *†‡	62	− 5	27.0	0.90	2.0
Grainfield *§	70	− 6	29.0	T.	T.
Grenola *‡	53e	− 1	28.8	0.95	4.0
Halstead	60	− 6	28.6	0.68	5.2
Horton	58	− 6	25.8	1.40	5.5
Hutchinson †	65	− 8	32.2	0.95	6.0
Independence †	64	− 3	31.3	2.46	4.4
Lakin †	65	− 7	32.8	0.01	0.1
Lawrence	61	− 4	27.4	1.51	6.8
Lebo †	60	− 3	27.5	1.62	5.6
Macksville	58	− 4	27.9	0.47	10.0
McPherson †	50	− 5	25.7	1.16	10.0
Manhattan b	58	− 5	27.8	1.32	7.8
Manhattan c	69	− 5	28.2	1.47	5.3
Marion †	56	− 3	28.8	1.10	8.0
Meade †	63	− 2	32.6	1.50	15.0
Medicine Lodge †	60	− 3	29.5	0.64	7.0
Minneapolis †	58	− 4	27.1	0.79	5.6
Morantown †	61	− 5	29.2	2.60	5.8
Morland d	70	−10	29.2	.....	.....
Morton †	63	− 9	30.4	0.80	8.0
Mounthope *‡	53b	0b	28.1b	0.60	5.0
Norton	58	−14	27.4	0.41	3.0
Norwich †	60	0	30.0	0.98	7.0
Oberlin †	.....	.....	.....	0.40	2.0
Olathe †	60	− 4	28.4	.....	...
Osage City †	59	− 4	27.4	1.33	7.0
Oswego	66	− 2	32.4	3.47	3.4
Ottawa	68	− 2	28.0	2.22	3.5
Paola †	65	− 5	27.5	2.35	5.0
Phillipsburg †	.....	...	.....	1.58	14.0

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Kansas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Pleasant Dale	.....	— 5	.....	2.50	15.5
Powhattan	57	— 8	24.4	1.15	6.5
Pratt	57	— 2	26.4	1.60	6.5
Rome*†	57	2	31.4	1.00	5.0
Russell†	.....	— 8	.....	1.80	12.2
Salina†	57	—10	27.1	1.00	6.2
Scott City	62	—12	27.6	0.13	.....
Sedan†	62	— 2	31.9	2.10	4.0
Sharon Springs*‖	76	— 9	28.9	.....	.....
Ulysses†	61°	— 8°	26.1°	0.55	5.5
Wallace*‖	70	—12	27.0	0.01	0.2
Wamego*‖	58	— 4	26.4	1.24	8.0
Wellington*‖	60	2	32.9	0.21	4.2
White Rock	.....	.....	.....	0.40	3.5
Winona*‖	74	— 8	31.2	0.02	0.2
Yates Center	62	— 5	28.6	1.51	5.2
Kentucky.					
Alpha†	70	— 6	37.0	4.55	5.5
Ashland*‖	75	— 8	29.6	.....	12.0
Bardstown†	69	— 1	31.3	2.51	3.0
Blandville†	67	0	32.6	4.43	0.5
Bowling Green *a*‖	68	— 6	31.4	3.44	2.0
Bowling Green *b*†	72	— 3	33.6	3.34	2.0
Burnside†	.....	.....	.....	2.75	3.0
Caddo†	67	—10	28.4	2.77	8.0
Canton*†	66	— 8	34.8	3.90	2.5
Carlisle	.....	.....	.....	2.80	6.5
Carrollton†	67	— 6	30.8	2.54	5.0
Catlettsburg*†	66	— 5	30.2	3.21	11.0
Earlington	66	— 2	34.0	3.70	3.0
Edmonton†	68	—10	33.0	2.87	4.1
Eubank*†[f]	60	—10	28.3	2.22	5.0
Falmouth†	.....	.....	.....	2.55	8.0
Fords Ferry†	63	0	33.5	2.90	2.0
Frankfort†	70	— 6	30.0	2.97	5.0
Franklin†	66	— 1	33.7	4.50	3.0
Georgetown	68	— 7	29.8	.....	.....
Greensburg†	70	— 8	33.2	3.62	5.2
Henderson†	67	2	34.7	3.35	1.0
Hopkinsville†	65	— 2	34.8	4.47	1.5
Leitchfield†	67	— 5	30.6	3.36	3.0
Lexington*‖	66	— 6	30.2	2.54	6.6
Louisa† *a*	.....	.....	.....	2.10	3.0
Louisa *b**‖	70	—16	31.4	.....	6.0
Lyndon	69	— 5	28.8	2.48	3.0
Marrowbone†	69	—11	32.0	2.98	3.0
Maysville*†	65	— 6	31.6	.....	6.0
Middlesboro†	67	—13	31.0	4.03	3.5
Mount Sterling†	67	— 7	28.8	3.24	7.0
Munfordville*‖	69	0	34.1	.....	.....
Owensboro†	67	— 3	32.0	3.73	1.0
Owenton†	65°	— 7°	31.4°	2.71	6.0
Paducah *a*†	.....	.....	.....	3.21	1.0
Paducah *b*†	68	4	35.7	3.94	1.0
Pilot Oak	68	1	32.8	4.96	10.3
Pleasure Ridge Park†	69	— 6	30.8	3.50	4.0
Princeton	65	— 9	32.3	4.13	2.0
Richmond†	70	— 7	31.3	2.13	4.7
Russellville†	68	— 4	35.3	4.25	5.0
St. John†	67	— 5	30.9	3.41	3.3
Sandyhook	.....	.....	.....	2.77	2.2
Shelbyville†	67	— 7	30.3	2.95	5.0
Vanceburg†	64	— 5	28.2	.....	.....
Williamsburg†	68	—11	35.2	3.74	5.0
Louisiana.					
Abbeville	76	20	49.6	5.36	
Alexandria†	74	17	46.8	7.59	1.0
Amite†	.....	.....	.....	5.19	
Bastrop†	76	5	45.5	5.92	2.0
Baton Rouge†	75	20	49.1	4.83	
Calhoun	75	10	42.6	7.06	1.8
Cameron†	.....	.....	.....	10.73	
Cheneyville†	77	15	48.0	6.69	3.0
Clinton†	72	17	45.6	4.84	2.0
Covington	78	14	48.4	7.70	
Davis	75	10	42.7	6.47	
Donaldsonville†	79	20	48.8	4.07	
Elm Hall	78	16	47.3	.....	
Emilie†	72	19	48.7	3.45	T.
Farmerville	75	0	42.3	6.00	3.5
Franklin†	77	21	49.9	5.54	T.
Grand Coteau	75	21	50.5	6.42	
Lafayette†	.....	.....	.....	4.45	
Lake Charles†	77	20	50.4	10.95	0.5
Liberty Hill	76	9	44.2	6.84	5.5
Mansfield†	75	11	44.9	6.45	1.0
Melville	80	18	47.7	5.51	T.
Monroe†	73	18	45.0	5.85	1.5
Montgomery	78	16	44.6	8.77	1.0
New Iberia	76	19	48.6	4.85	
Oakridge†*	74	9	42.6	6.52	3.0
Oberlin	74	17	46.8	12.20	2.0
Opelousas†	78	19	48.8	6.26	
Oxford†	74	11	45.0	8.67	0.8
Paincourtville†	77	18	49.4	3.86	1.0
Plain Dealing†	72	12	43.9	7.67	1.3

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Louisiana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Ruston	72	10	44.0	4.81	2.0
Southern University†	74	21	50.0	2.80	
Sugar Ex. Station†	79	23	50.0	3.44	.....
Sugartown†	74	18	48.6	7.64	.....
Thibodeaux	.....	.....	.....	3.39	1.0
Venice†	76	26	53.2	5.69	
Wallace	75	20	50.2	3.51	0.8
White Sulphur Springs	.....	.....	.....	8.78	2.0
Maine.					
Bar Harbor	54	—11	21.4	4.82	31.0
Belfast*[6]	52	—11	20.5	3.98	15.0
Calais†	53	—14	19.3	4.74	29.0
Cornish*‖	52	—10	21.2	4.02	24.2
Cumberland Mills	52	— 9	24.8	4.25	12.6
Fairfield	54	—17	18.6	3.31	13.0
Farmington†	44	—15	19.2	5.45	24.0
Flagstaff†	50	—21	14.2	2.90	21.0
Fort Fairfield	52	—22	10.2	1.44	14.0
Gardiner	54	—12	20.1	4.51	14.5
Indian Stream	48	—23	13.3	3.99	24.5
Kineo†	46	—23	14.4	2.82	14.5
Lewiston	50	— 8	21.8	5.17	21.7
North Berwick*‖	52	— 7	22.9	5.25	18.8
North Bridgton	48	—14	20.6	4.59	25.0
Orono	52	—18	16.6	3.03	23.2
Petit Menan*‖	47	— 9	23.9	.....	.....
Winslow	55	—12	19.8	.....	.....
Maryland.					
Bachmans Valley	60	1	27.0	2.20	6.0
Boettcherville[2]	.....	.....	22.6	1.90	10.0
Charlotte Hall†	64	5	33.2	1.75	6.5
Cherryfields†[3]	.....	.....	31.8	1.92	8.8
Chestertown†	63	8	30.0	2.40	7.5
Collegepark	54[g]	— 2[g]	27.5[g]	1.76	5.0
Cumberland *a*	60	3	27.2	1.76	8.0
Cumberland *b*	64	3	31.6	1.80	7.5
Darlington†	65	5	29.4	1.93	6.0
Deerpark	.....	—12	.....	2.80	20.0
Easton†	65	8	30.9	2.04	5.5
Ellicott City	59	8	31.4	1.93	7.0
Fallston*‖	60	6	28.6	2.19	5.5
Flintstone	60	— 6	27.4	2.02	9.0
Frederick	64	5	29.6	1.39	6.8
Grantsville	56	— 9	22.7	3.97	28.5
Greatfalls*[5]	63	6	29.6	1.22	.....
Greenspring Furnace	63	4	28.2	1.96	5.0
Hagerstown†	62	4	30.4	0.87	5.5
Jewell†	66	6	31.2	2.19	4.0
Johns Hopkins Hospital	61	5	29.5	1.81	.....
Laurel	.....	.....	.....	2.05	5.0
McDonogh[g]	61	4	28.6	.....	.....
Mardela Springs†	65	6	32.0	2.48	9.8
Mount St. Marys Coll.†	60	3	28.0	2.26	7.1
New Market	62	4	28.3	1.66	5.0
Pocomoke City	64	12	37.1	1.95	4.0
Princess Anne	64	3	32.2	1.65	9.0
Sharpsburg	62	3	27.7	1.31	4.7
Solomons†	56	10	33.2	1.68	8.2
Sunnyside	60	—11	22.8	3.07	19.0
Taneytown†	63	4	28.0	1.84	7.0
Van Bibber	68	7	28.6	2.08	.....
Western Port	59	— 1	25.9	1.88	7.5
Westminster	60	2	28.3	.....	9.2
Woodstock	61	4	29.2	1.78	5.5
Massachusetts.					
Adams	58	— 5	24.9	.....	22.0
Amherst	55	— 1	25.6	3.78	24.0
Andover†	55	— 2	25.8	3.75	23.0
Ashland	.....	.....	.....	3.87	.....
Attleboro	.....	.....	.....	4.29	.....
Bedford	57	0	26.1	4.09	19.5
Bluehill (summit)	57	— 1	25.4	4.16	18.5
Boston *a*	.....	.....	.....	3.06	15.0
Brockton *a*	57	2	28.1	3.18	15.0
Brockton *c*	.....	.....	.....	3.07	.....
Cambridge *a*	58	1	27.8	4.01	.....
Chestnut Hill	58	0	27.5	4.09	14.0
Clinton *a*	.....	.....	.....	1.95	.....
Cohasset	.....	.....	.....	3.85	14.8
Concord†	57	— 4	25.0	3.18	16.6
Dudley[1]	53*	— 6	24.8	2.77	15.5
East Templeton*‖	52	— 4	22.9	2.09	19.2
Egg Rock, Nahant	50	0	26.3	.....	.....
Fallriver	57	6	28.5	4.35	15.0
Fiskdale	.....	.....	.....	2.34	.....
Fitchburg *a**‖	52	— 1	24.2	2.61	18.5
Fitchburg *b*	56	— 3	24.3	3.22	19.5
Framingham	59	— 3	27.2	4.14	.....
Groton	55	— 4	24.1	3.08	20.5
Hadley	54	— 6	23.8	.....	.....
Hingham	.....	.....	.....	3.61	16.5
Hobbs Brook	.....	.....	.....	4.26	14.8
Hyannis*†‖	52	4	31.2	2.71	11.0
Hydepark*[6]	.....	— 2	24.5	.....	19.0
Lake Cochituate	55	— 6	27.0	4.95	.....
Lawrence	56	— 3	25.0	4.22	16.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Massachusetts—Cont'd.	°	°	°	*Ins.*	*Ins.*
Leeds	51	—15	24.0	3.75	23.0
Leicester Hill	54	— 3	22.6	3.60	21.0
Leominster	.....	.....	.....	3.41	17.0
Long Plain*[6]	53	— 2	27.0	3.82	8.0
Lowell *a*	56	— 1	26.0	4.35	.....
Lowell *b*	56	— 3	29.4	.....	.....
Lowell *c*	57	0	28.2	.....	.....
Ludlow Center	57	— 9	21.7	4.10	21.5
Lynn *a*	53	0	26.3	2.37	.....
Mansfield*‖	56	— 4	25.2	5.08	18.8
Middleboro	55	— 2	26.4	4.52	10.0
Milton	58	2	27.2	2.63	16.0
Monson	56	— 6	26.4	4.18	23.5
Mount Nonotuck	.....	.....	.....	3.42	27.0
Mount Wachusett	.....	.....	.....	3.19	17.0
Mystic Lake	.....	.....	.....	3.81	.....
Mystic Station	.....	.....	.....	3.41	.....
Natick*‖	54	— 2	24.7	5.62	16.5
New Bedford *a*	49	4	27.4	3.97	15.5
New Bedford *b*	54	2	28.0	3.78	13.8
North Billerica	58	1	26.8	3.60	21.0
Pittsfield	55	— 4	23.0	3.52	19.8
Plymouth*‖	53°	6	29.8°	4.24	16.0
Princeton	.....	.....	.....	2.92	16.0
Quinapoxet	50	— 4	22.2	4.89	25.5
Roberts Dam	.....	.....	.....	4.38	16.0
Salem	.....	.....	.....	2.80	12.0
Somerset*‖	60	0	28.9	3.88	19.0
South Clinton	.....	.....	.....	3.29	17.8
Springfield Armory	55	— 3	24.2	3.99	25.5
Sterling	.....	.....	.....	3.59	14.5
Taunton *b*	56	0	26.6	4.32	16.2
Taunton *c*	56	— 5	26.0	4.23	.....
Turners Falls	46	— 3	21.2	3.11	24.6
Wakefield†	57	3	26.4	4.50	22.0
Waltham	.....	.....	.....	4.16	.....
Webster	.....	.....	.....	3.25	22.1
Westboro†	57	— 6	28.0	2.44	13.0
Weston	57	0	26.6	4.29	18.7
Williamstown*‖	55	— 6	23.4	2.62	14.5
Winchendon	.....	.....	.....	3.71	24.0
Winchester	.....	.....	.....	3.95	16.0
Worcester *a*	52	1	24.7	3.41	.....
Worcester *b*	55	2	26.3	3.26	14.0
Michigan.					
Adrian	58	—23	21.8	2.36	11.5
Alma	54	— 8	22.6	4.96	8.6
Ann Arbor	54	—16	20.7	2.79	13.0
Arbela	54	—11	22.3	4.05	6.8
Baldwin	56	—12	19.0	5.43	12.9
Ball Mountain	53	—14	22.8	2.68	9.3
Baraga	48	—30	14.9	2.43	24.8
Battlecreek	56	—12	22.2	4.80	13.4
Bay City *b*	54[g]	— 6	25.7[g]	3.70	6.0
Benton Harbor	59	— 6	25.4	4.31	10.4
Benzonia	55	— 5	23.1	3.95	13.2
Berlin	54	—16	21.6	3.15	12.2
Berrien Springs	59	—14	22.4	7.88	42.5
Big Rapids	55	— 8	20.6	6.68	4.6
Birmingham	56	—15	23.1	.....	.....
Boon	53°	—17	18.1	7.24	21.7
Bronson	56	—18	21.2	3.43	12.0
Calumet	46	—13	16.3	3.01	36.5
Camden	55	—18	21.1	3.45	12.5
Carsonville	54	— 8	21.3	1.83	6.4
Charlevoix	46	— 1	23.2	6.40	14.0
Cheboygan	51	— 6	19.8	2.69	4.4
Clinton	55	—19	21.9	2.35	12.4
East Tawas	44	— 5	21.2	3.17	.....
Escanaba†	42	—19	17.9	2.95	5.5
Fairview	59	—18	21.1	2.62	15.8
Fitchburg	55	—16	21.0	5.48	23.3
Flint	54	—12	21.3	2.00	6.5
Gaylord	51	— 5	16.2	4.37	17.7
Gladwin	54°	—10	22.6	5.68	3.8
Grape	58	—19	23.8	2.03	14.2
Grayling	50	—16	17.2	2.27	14.5
Hanover	56	—18	21.8	3.70	13.3
Harrison[j]	51	—12	19.0	3.93	9.0
Harrisville	46	—10	20.4	3.11	6.6
Hart	57	— 3	24.8	9.05	43.0
Hastings	54	—14	22.8	6.40	15.9
Hayes	55	— 3	24.2	3.33	8.0
Hesperia	55	— 5	22.2	8.32	21.1
Highland Station	53[d]	—18[d]	19.8[d]	3.52	6.2
Holland*[9]	56	1	26.8	.....	.....
Howell	54	—11	21.4	2.90	6.8
Humboldt	44°	—42	12.4	1.15	10.0
Ionia	56	—12	22.4	4.18	6.0
Iron River	48	—29	11.4	2.44	11.0
Jeddo	55	—12	21.7	2.53	9.5
Kalamazoo	56	—13	21.4	6.98	30.4
Lake City	53	—12	19.4	5.66	27.0
Lansing	56	—12	21.6	3.72	9.2
Lapeer	55	12	22.0	2.72	5.5
Lathrop	46	—20	14.8	2.80	12.5

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Michigan—Cont'd.	°	°	°	*Ins.*	*Ins.*
Ludington	55	— 3	24.0	5.54	16.9
Luzerne	51	—10	16.8	3.41	8.9
Mackinaw City	50	— 4	19.8	2.07	4.0
Madison	55	—19	22.2	2.38	12.7
Mancelona	52	— 4	19.0	4.66	26.5
Manistee	56	— 5	23.4	5.07	23.5
Manistique	44	—15	18.9	3.67	19.5
Mayville	52	—10	22.2	3.89	10.8
Middle Island *[b]	47	— 2	24.0	.....	.....
Midland	54	— 9	21.7	4.36	.....
Mottville	58	—21	21.1	4.36	17.4
Mount Clemens	56	—15	22.7	1.38	6.8
Mount Pleasant *b*	53	— 8	21.6	4.24	3.7
Muskegon	57	— 1	23.3	7.72	16.0
Newberry	51	—12	17.5	3.99	21.0
North Marshall	56	—15	20.1	5.25	16.0
Northport	53	0	22.6	3.92	18.0
Old Mission	55	— 2	22.7	3.11	18.0
Olivet	56	—11	22.6	4.30	9.4
Ovid	55	—11	22.8	4.18	7.0
Owosso	54	—12	21.8	4.30	8.2
Parkville	.....	.....	.....	5.26	15.0
Petoskey	54	— 2	21.8	3.21	14.2
Plymouth	56	—16	21.6	2.10	11.0
Pontiac	55	—13	22.4	2.88	14.0
Port Austin	53	— 2	22.2	4.17	.....
Powers	49	—23	17.0	2.16	6.0
Reed City	54	—10	20.2	4.92	11.0
Rockland	48	—20	13.7	4.90	31.5
Rogers City	53	—11	19.8	2.29	11.0
Romeo	54	—14	22.4	.....	.....
Saginaw	55	— 6	22.6	5.36	8.2
St. Ignace	45	—15	18.4	2.29	4.0
St. Johns	54	—12	23.0	4.69	.....
Sandbeach *a*	59	— 8	23.0	.....	.....
Sidnaw	43	—22	13.1	2.88	19.0
Somerset	59	—17	19.7	3.89	14.0
South Haven	58	1	24.0	4.47	27.7
Stanton	54	—11	21.4	3.85	11.2
Thomaston	48	—29	10.0	4.40	48.6
Thornville	53	— 8	22.6	2.39	9.0
Traverse City	55	— 6	25.2	3.88	16.5
Valley Center *	49	—11	18.8	1.48	3.0
Vandalia	57	—19	22.6	7.42	30.9
Wasepi	59	—19	19.8	4.24	.....
Waverly	58	—14	21.4	8.81	39.2
West Harrisville	50	—10	16.6	2.93	5.0
Wetmore	48	—15	17.4	3.26	24.0
Ypsilanti	57	—17	23.9	2.08	11.6
Minnesota.					
Ada†	.....	—35	.....	0.44	2.8
Albert Lea†	53	—30	11.4	3.02	22.0
Alexandria†	38	—38	4.1	2.15	20.3
Beardsley†	40	—27	4.6	1.83	10.8
Belleplaine *[1]	31	—32	8.7	0.20	2.0
Bermidji	40	—40	—1.2	.....	.....
Bingham Lake	48	—33	10.8	.....	.....
Bird Island	42	—27	8.5	1.49	10.7
Blooming Prairie†	52	—31	9.8	1.10	8.0
Bonniwell	44	—27	8.6	1.12	14.0
Caledonia†	55	—27	13.6	2.48	6.5
Cambridge†	43	.....	.....	1.44	13.0
Camden	43	—34	9.0	2.18	19.0
Campbell	37	—31	3.2	3.12	19.5
Collegeville	43	—27	8.4	1.22	13.8
Crookston†	37	—31	—0.6	0.37	7.0
Dawson	.....	.....	.....	1.30	12.5
Detroit City	45	—43	1.9	1.72	.....
Fairbault	34*	—29*	6.6*	1.30	12.0
Farmington†	48	—35	7.0	1.77	18.5
Fergus Falls†	40	—29	7.0	1.64	13.4
Glencoe†	45	—24	8.2	1.21	.....
Glenwood†	37	—30	3.6	1.50	13.5
Grand Meadow†	52	—30	10.4	0.85	8.0
Grand Portage	.....	.....	.....	2.99	17.8
Lake City	52	—27	12.5	0.63	4.5
Lakeside†	43	—27	6.4	1.30	13.0
Lake Winnibigoshish *[1]	39	—30	1.2	2.30	21.7
Lambert†	40	—35	0.8	0.85	5.0
Lawrence†	40	—30	8.2	2.75	7.5
Leech Lake[1]	41*	—47	—0.9	1.83	17.0
Lesueur *[1]	48	—28	8.9	1.80	18.0
Long Prairie†	41	—30	4.6	1.52	15.0
Lutsen	42	—27	10.2	2.41	.....
Luverne†	46	—25	10.4	1.06	10.6
Mapleplain	45	—31	6.8	2.26	18.5
Mazeppa[1]	50*	—30	13.2	0.40	4.0
Milan†	40	—31	4.9	4.80	46.0
Minneapolis *a*†	46	—29	8.6	1.66	16.6
Minneapolis *b*[1]	47*	—30	8.2	1.58	15.2
Minnesota City *†[1]	56	—24	15.7	2.01	8.0
Montevideo†	42	—25	5.4	1.68	15.3
Morris	38	—28	5.0	1.40	13.0
Mount Iron	42	—36	2.7	3.30	34.0
New London	40	—31	2.6	2.55	5.5
New Richland *[1]*	50	—36	9.6	.....	.....
Minnesota—Cont'd.					
New Ulm†	45	—28	9.0	2.05	18.0
Park Rapids†	39	—42	1.5	2.25	20.4
Pine River[1]	42*	—39	3.5	2.79	29.9
Pleasant Mounds†	47	—27	9.6	1.57	13.0
Pokegama Falls[1]	39*	—49	1.3	1.74	13.6
Rolling Green	45	—25	9.3	1.90	11.0
Roseau	39	—37	—0.5	1.51	12.9
St. Charles†	54	—27	12.6	2.25	12.0
St. Cloud	42	—38	5.7	2.75	23.5
St. Olaf	38	—27	4.4	1.59	17.9
St. Peter	.....	.....	.....	1.15	11.5
Sandy Lake Dam[1]	40*	—37	3.7	2.18	22.7
Shakopee[6]	47*	—30	9.2	1.56	13.5
Tower†	45	—45	2.9	1.92	19.2
Two Harbors†	40	—24	11.3	1.94	13.5
Wabasha *[1]	53	—27	12.7	2.08	6.0
Willmar†	41	—27	6.2	1.77	10.2
Winona	59	—22	13.9	2.00	4.5
Worthington	38	—27	9.0	0.62	5.7
Zumbrota[1]	52*	—32	10.5	.....	.....
Mississippi.					
Agricultural College	73	11	41.0	4.41	1.1
Austin†	68	13	39.8	7.71	T.
Batesville†	65	10	39.6	5.02	0.4
Bay St. Louis	72	19	49.6	2.41	.....
Biloxi†	70	19	47.9	4.88	T.
Briers†	70	16	44.4	7.47	.....
Brookhaven†	70	11	45.2	7.05	1.0
Canton†	69	15	44.6	5.50	0.5
Columbus *a*†	.....	.....	.....	4.31	T.
Columbus *b*	73	9	42.0	.....	.....
Crystal Springs†	68	15	43.9	7.57	1.0
Edwards	71	14	43.6	7.75	1.0
Fayette†	71	16	46.8	8.73	.....
French Camp†	70	3	41.0	4.62	0.9
Fulton†	70	0	39.4	6.23	1.0
Greenville *a*	69	14	41.4	4.50	1.8
Greenville *b*†	74	9	41.6	4.31	1.8
Holly Springs	67	8	38.6	4.77	.....
Jackson†	71	14	43.0	5.70	0.5
Kosciusko†	69	7	41.8	7.83	1.0
Leakesville†	75	15	48.9	5.63	1.5
Logtown†	72	20	50.2	3.45	0.5
Louisville†	70	8	42.5	6.37	1.0
Macon†	74	12	41.6	3.74	.....
Magnolia†	71	16	46.8	5.51	1.2
Mayersville	72	10	43.4	5.55	2.0
Meridian†	72	14	43.4	5.57	.....
Mosspoint	72	19	48.2	4.40	2.2
Natchez†	75	17	46.6	7.06	0.7
Okolona†	71	8	39.2	4.83	T.
Palo Alto†	71	7	41.1	6.17	3.1
Pontotoc	71	6	41.6	4.69	1.2
Poplarville	70	20	47.9	4.17	.....
Port Gibson†	71	17	46.0	6.82	0.2
Rosedale†	70	15	40.6	6.75	T.
Stonington *[1]	70	16	45.2	.....	.....
Thornton†	72	14	46.1	2.00	3.0
Topton *[5]	70	20	45.4	3.31	0.5
Water Valley *†[1]	69	— 2	39.2	6.01	1.5
Waynesboro *b*	76	.....	.....	4.50	.....
Woodville†	71	15	46.6	7.01	2.0
Yazoo City†	72	13	42.6	4.43	1.0
Missouri.					
Akron	.....	.....	.....	1.40	8.5
Appleton City	66	0	30.4	5.70	3.5
Arthur *†[3]	.....	— 3	27.6	4.30	3.0
Avalon	65	—10	23.7	3.65	4.4
Bethany	62	—11	28.1	1.05	5.0
Birchtree	62	— 8	31.6	7.88	2.0
Bolckow†	.....	.....	.....	1.18	5.0
Boonville†	.....	.....	.....	8.34	1.5
Brunswick	67	— 7	24.6	4.80	1.3
Carrollton†	65	— 4	27.6	3.68	4.0
Cedargap *[1]	62	— 5	30.4	9.07	5.0
Conception	64	— 7	26.1	1.43	5.0
Cowgill *[5]	58	—10	23.6	1.78	2.2
Darksville†	60	— 7	26.0	4.30	3.0
East Lynne *[3]	.....	— 3	26.4	4.26	6.0
Edgehill *[5]	58	— 4	30.4	6.07	2.5
Eightmile *[1]	64	— 3	27.2	3.62	6.7
Elmira	66	— 7	25.4	1.89	6.0
Emma *[2]	.....	— 4	26.0	3.72	2.5
Fairport	.....	.....	.....	1.44	6.7
Farmersville	.....	.....	.....	2.42	7.2
Fayette	67	— 6	26.8	6.58	2.9
Fulton	.....	.....	.....	8.42	1.0
Gallatin *[3]	63	— 8	24.4	1.78	7.5
Glasgow	70	— 4	26.8	4.68	1.5
Gordonville *[3]	.....	0	29.0	5.16	2.2
Gorin	.....	.....	.....	4.63	4.5
Grovedale	64	— 4	29.5	10.37	3.3
Halfway	70	— 5	29.6	6.40	3.0
Harrisonville†	66	— 3	26.2	3.40	5.8
Hastain	60	— 5	30.6	6.29	1.0
Hermann†	.....	.....	.....	7.50	.....
Missouri—Cont'd.					
Houston	64	— 2	33.3	6.24	3.0
Houstonia	.....	.....	.....	5.13	6.8
Humansville	68	—11	31.4	5.26	3.8
Irena	.....	.....	.....	1.49	5.2
Ironton†	62	— 4	31.2	7.40	1.5
Jefferson City†	66	— 1	30.0	7.82	3.0
Kidder	62	— 8	24.4	1.95	5.9
Lamar†	66	— 2	30.6	5.10	3.5
Lamonte	.....	.....	.....	5.02	1.5
Lebanon	65	0	30.8	7.60	3.0
Lexington†	66	— 5	27.8	3.95	4.5
Liberty	63	— 3	26.2	2.12	3.0
McCune *†[1]	60	— 8	25.2	7.06	5.5
Macomb	.....	.....	.....	8.52	5.0
Mansfield	.....	.....	.....	7.10	4.0
Marblehill	69	—10	31.2	5.86	4.0
Marshall†	70	— 5	34.3	4.44	4.6
Maryville	75	—14	31.6	1.74	6.0
Mexico†	67	— 5	26.7	6.58	3.1
Mine La Motte†	61	— 3	31.8	5.26	1.2
Mineralspring	72	— 2	33.6	5.53	3.0
Montreal *[1]	63	— 4	28.1	6.25	3.5
Mount Vernon	65	— 6	31.1	4.93	5.5
Neosho	69	— 4	33.0	4.20	2.0
Nevada	.....	.....	.....	3.98	4.8
New Haven *[1]	68	— 2	33.2	7.90	2.0
New Madrid	66	— 4	34.8	6.11	1.0
New Palestine *†[1]	70	— 2	29.7	5.48	2.8
Oakfield	63	— 3	30.8	4.38	4.8
Oakmound	.....	.....	.....	6.32	2.0
Oakridge *† [4]	.....	— 2	31.0	5.41	4.0
Olden†	62	— 3	31.0	6.81	2.7
Oregon *a*	61	— 8	24.2	1.74	7.8
Oregon *b* [1]	59	— 9	23.2	1.36	5.6
Osceola†	.....	.....	.....	5.80	1.5
Oto	.....	.....	.....	5.42	1.2
Palmyra *[1]	68	—10	26.6	7.14	8.0
Phillipsburg *†[1]	64	— 5	29.4	8.05	4.0
Pickering *[3]	62	—10	24.5	1.91	7.8
Platte River *[3]	66	— 6	21.4	1.12	3.0
Poplar Bluff	67	0*	34.4*	5.90	1.5
Potosi	57	—12	24.2	4.68	5.0
Princeton *[1]	63	—13	22.8	3.05	6.0
Rhineland	66	0	30.2	7.48	1.5
Richmond	64	— 5	25.8	3.47	4.8
Rolla	.....	.....	.....	7.73	3.8
St. Charles	64	— 4	30.9	3.84	4.8
St. James *[3]	.....	0	28.4	.....	4.0
St. Joseph†	.....	.....	.....	1.69	4.0
St. Louis (V. O.)	63	— 3	28.9	3.58	2.0
Sarcoxie *[3]	60	0	29.0	4.65	3.4
Shelbina	.....	.....	.....	8.10	5.0
Sikeston	67	1	36.6	4.81	1.0
Steffenville	.....	.....	.....	5.79	5.0
Stellada†	68	— 4	29.6	4.95	10.0
Sublett	64	—14	22.2	7.06	5.6
Trenton	60	— 9	24.6	1.35	6.0
Virgil City	.....	.....	.....	5.59	8.5
Warrenton	64	— 4	26.6	8.78	1.5
Wheatland	.....	.....	.....	3.16	2.0
Willow Springs	66	— 6	33.6	7.58	2.0
Zeltonia *[1]	66	0	34.3	5.43	1.8
Montana.					
Augusta†	55	—41	23.4	0.57	5.3
Bigtimber†	62	—28	26.8	1.00	10.0
Billings†	.....	—38	.....	0.90	9.0
Boulder *	42	—35	11.6	.....	.....
Bozeman†	46	—25	17.2	1.10	11.0
Bozeman Exper. Stat'n.	53	—24	18.8	1.51	15.1
Butte†	48	—27	18.1	1.30	11.0
Castle	42	—32	20.6	0.58	5.8
Chinook†	65	—40	11.9	0.60	6.0
Choteau†	56	—30	23.3	0.60	6.0
Cokedale†	50	—26	25.6	0.65	6.0
Columbia Falls	41	—10	22.4	2.21	19.2
Deer Lodge	50	—33	14.8	0.34	3.0
Ekalaka	45	—28	16.3	0.46	4.6
Fort Custer†	55	—33	19.1	0.49	4.9
Fort Keogh†	52	—29	15.5	1.00	10.0
Fort Logan† [1]	44	—31	17.4	0.62	6.2
Fort Missoula	48	—17	18.8	0.73	7.0
Glasgow†	42	—44	4.4	0.72	7.2
Glendive†	46	—32	12.4	1.70	17.0
Greatfalls†	52	—23	24.2	0.31	3.0
Hogan†	50	—33	24.1	0.67	6.2
Kipp†	53	—44	23.2	0.30	3.0
Lewistown†	56	—30	32.6	0.90	9.0
Libby†	51	—17	26.8	0.61	3.0
Livingston†	56	—28	23.2	0.44	4.4
Manhattan†	51	—39	14.0	0.51	5.0
Martinsdale†	47	—32	23.5	0.40	4.0
Marysville†	43	—26	20.2	1.57	12.5
Monarch	55	—29	23.8	0.92	9.2
Poplar†	40	—46	5.3	1.85	18.5
Radersburg	53	—40	20.8	0.50	5.0
St. Ignatius Mission†	50	—10	26.3	0.42	.....

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Montana—Cont'd.	°	°	°	*Ins.*	*Ins.*
St. Pauls†	50	—40	17.8	0.14	1.4
Sun River	50	—30	22.2	T.	T.
Troy	45	— 4	26.4	0.90	2.0
Utica†	50	—29	22.0	0.30	3.0
Virginia City†	47	—25	19.8	0.21	2.1
Wibaux†				0.95	9.5
Yale†	49	—21	20.8	0.40	4.0
Nebraska.					
Agee[*1]	50	—14	18.8	1.37	9.8
Alliance[*1]	52	—18	18.9	0.43	4.5
Ansley†	64	—15	22.6	0.40	2.5
Arapaho[*1]	50	—18	21.9	0.40	1.0
Arborville[*1]	47	— 8	22.4	1.72	13.0
Arcadia	65	—12	24.6	0.82	6.0
Ashland *a*†	50	—10	23.5	0.32	4.0
Ashton	56	—12	22.0	0.23	1.0
Auburn[*†1]	56	—10	24.2	1.02	4.5
Aurora[*1]	50	— 6	24.6	0.62	6.2
Bassett	57	—19	18.0	1.50	15.0
Beatrice†	50	—11	23.4	0.30	3.0
Beaver City†	61	—14	27.6	0.28	0.5
Bluehill[*1]	52	— 6	25.1	0.68	5.0
Bratton[*1]	55	—10	22.4	0.90	8.0
Brokenbow[*1]	60	—10	24.2	0.10	1.0
Burchard				0.75	3.0
Burwell				0.50	4.0
Callaway†	61	—12	22.2	0.35	4.0
Central City[*5]	50	— 6	23.8	0.91	8.0
Chester[*1]	50	— 6	23.9	0.50	3.0
Columbus†	52	—12	20.9	0.69	6.0
Cornlea				1.47	12.5
Creighton†	47	—17	15.4	2.10	
Crete	50	—10	23.4	1.45	13.0
Culbertson				0.71	3.5
Curtis *a*	68	—11	28.8	T.	T.
David City[*†1]	46	—12	21.1	0.95	8.0
Divide				0.22	1.8
Dunning				0.50	5.0
Edgar[*1]	49	— 7	23.8	1.20	7.0
Elba				0.19	
Ericson[*†1]	53	—12	20.2	1.00	9.0
Ewing†				0.90	9.0
Fairbury†	50	— 8	25.2	0.44	5.0
Fairmont[*†1]	48	— 7	24.9	0.63	6.0
Filley				0.40	4.0
Fort Robinson	63	—21	22.6	1.90	19.0
Franklin†	60[b]	—11[b]	25.9[f]	0.60	6.0
Fremont†	45	—12	20.1	0.92	9.0
Geneva†	50	—10	24.8	0.60	3.5
Genoa	46	—11	20.1	1.36	7.0
Gering†	62	—20	23.4	0.19	1.9
Gothenburg	60	—11	23.0	0.44	
Grand Island *a*[*1]	62	— 6	26.6	0.67	4.2
Grand Island *b*	54	—10	23.2	0.70	6.2
Greeley	53	—12	21.0	0.58	5.0
Haigler[*1]	58	—10	22.6	T.	T.
Hartington†	45	—19	13.7	2.50	23.0
Harvard[*1]	50	—10	22.6	1.25	12.5
Hastings[*1]	50	— 6	24.5	0.29	1.0
Hay Springs	58	—18	19.4	2.45	24.5
Hebron†	51	— 8	25.4	0.65	4.2
Hickman				0.45	4.5
Holdredge *a*				0.20	2.0
Holdrege *b*[*1]	56	—12	26.1	0.70	2.5
Imperial *a*†	60	—18	24.4	0.50	5.0
Indianola (near)[*1]	59	—16	24.4	0.80	5.0
Kennedy	61	—17	19.2	1.00	10.0
Kimball†	63	—20	24.7	0.20	2.0
Kirkwood[*1]	50	—15	15.4	0.90	9.0
Lexington†	66	—14	25.6	0.20	2.0
Lincoln *b*†	51	— 8	23.1	0.46	4.4
Lincoln *d*	48	— 8	21.5	0.68	3.8
Lodgepole†	64	—22	23.0	0.15	1.5
Loup *a*[*1]	52	—10	24.2	0.29	3.0
Loup *b*[*1]	62	—12	23.2	0.42	
Lynch[*†1]	50	—18	14.7	0.74	6.0
Lyons				1.17	9.5
McCook[*1]	63	—16	23.8	T.	T.
Madison[*1]	46	—12	19.0	0.43	4.0
Madrid[*5]	55	—10	24.2[g]	T.	T.
Marquette				1.53	13.0
Milford				1.20	12.0
Minden *a*[*1]	54	—12	23.7	0.80	5.8
Minden *b*				0.76	
Nebraska City *a*				0.78	7.0
Nebraska City *b*[*1]	52	— 8	23.8	0.50	
Nemaha[*1]	58	— 8	21.8	0.58	6.0
Norfolk†	43	—16	16.8	0.70	5.0
Norman	57	— 9	24.6	0.45	3.1
North Loup†	55	—11	22.2	0.80	5.0
Oakdale†	47	—14	16.8	1.61	13.0
Odell[*5]	54	— 8	25.0	0.44	2.5
O'Neill†	54	—15	17.4	1.31	8.0
Ord	66	—11	23.2	0.41	
Osceola				0.60	6.0
Ough†				0.30	2.0
Nebraska—Cont'd.					
Palmer *b*				1.10	6.0
Plattsmouth *a*†				1.21	11.0
Ravenna *a*	63	—10	24.4	0.60	3.8
Ravenna *b*	60	— 4	25.7	0.50	
Redcloud *a*				0.40	5.0
Redcloud *b*[*1]	48	— 7	24.2	0.93	9.3
Republican[*1]	57	—14	25.2	0.40	4.0
Rulo[*1]	54	— 4	26.6	0.70	7.0
St. Libory	56	—10	23.8	1.11	6.0
St. Paul	55	— 8	25.1	0.96	6.0
Salem[*1]	52	— 4	27.0	0.42	3.2
Santee Agency†	50	—20	14.9	1.37	12.5
Sargent				0.74	4.0
Schuyler				0.90	4.0
Seneca[*1]	60	—12	23.0	0.55	5.5
Seward[*1]	47	— 7	22.4	0.80	8.0
Springfield[*1]	48	—15	18.2	0.74	6.7
Springview	56	—17	17.9	1.15	4.8
Stanton[*1]	45	—15	17.4	0.61	10.5
State Farm	51	— 9	23.8	0.31	
Strang[*1]	50	— 7	25.3	0.60	6.0
Stratton				0.59	
Stromsburg				1.91	
Superior[*5]	50	— 8	20.9	0.35	2.0
Sutton	53	—10	23.2	1.97	11.6
Syracuse				0.76	2.0
Tecumseh *b*†	53	—10	25.2	0.65	6.5
Tekamah	48	—16	17.6	1.50	13.0
Thedford[*1]	60	—16	20.3	0.75	7.5
Turlington†	48	—20	18.3	0.66	7.1
Valentine†	62	—20	19.1	1.22	
Wakefield				1.73	16.2
Wallace[*1]	52	—14	21.8	0.23	2.4
Weeping Water[*1]	49	—13	18.1	1.00	14.5
Whitman				0.50	5.0
Wilber[*1]	52	— 6	26.7	0.63	4.0
Willard				0.35	
Wilsonville[*1]	60	—18	26.6	0.38	0.5
Wisner				1.34	12.1
Woodlawn				0.20	
York[*1]	50	— 7	25.5	0.50	5.0
Nevada.					
Austin	46	10	30.2	1.30	13.0
Battle Mountain[*1]	52	14	32.7	0.69	0.5
Beowawe[*1]	52	10	31.2	0.58	1.0
Candelaria	63	14	37.4	0.08	5.0
Carlin[*1]	50	— 5	26.7	T.	T.
Carson City	55	10	33.5	1.47	7.2
Cloverdale[*1]	60	20	31.7	1.14	13.2
Clover Valley				1.97	22.0
Cranes Ranch				0.80	12.0
Darrough Ranch				0.81	8.0
Downeyville	62	12	38.4	0.40	2.0
Duckwater	47	5	27.2	0.21	3.3
Elko[*3]	46	— 1	27.9	0.58	5.8
Elko (near)	49	— 7	26.4	0.29	3.5
Ely	55	— 9	25.8	1.20	12.0
Empire Ranch	49	—15	25.0	1.11	12.0
Fenelon[*1]	48	0	23.6	0.85	8.5
Golconda[*1]	48	20	31.1	0.44	2.0
Halleck[*1]	48	— 9	24.4	0.70	8.4
Hawthorne *a*[*3]	54	23	36.8		
Hawthorne *b*	56	14	36.2	0.17	1.0
Hot Springs[*1]	55	10	33.7	T.	T.
Humboldt[*1]	50	12	32.5	0.36	2.5
Keysers Springs				0.25	2.5
Lewers Ranch	52	11	33.4	2.13	11.5
Los Vegas	55	23	40.8	1.71	0.0
Lovelock[*1]	65	16	35.2	0.44	5.0
Midas	52	13	32.2	1.39	9.5
Mill City[*1]	57	10	30.5	0.40	1.0
Osceola	56	9	32.6	1.88	21.0
Palisade[*1]	50	5	33.6	0.71	6.5
Palmetto	59	— 4	30.2	3.20	32.0
Reese River				1.80	20.0
Reno[*3]	47	12	31.8		12.0
Reno State University	52	5	30.4	1.05	6.5
Ruby Valley				1.43	22.6
St. Clair	47	7	31.8	0.97	7.0
San Antonio		0		1.04	9.4
Sodaville	58	9	34.6	0.22	4.0
Tecoma[*1]	37	2	24.4	0.44	5.0
Toano[*1]	52	0	25.0	1.10	12.0
Tuscarora	44	6	27.0	0.87	5.5
Tybo	45	5	26.0	3.30	33.0
Verdi[*1]	53	7	32.8	1.35	18.0
Wadsworth[*1]	56	10	28.1	C.89	9.0
Wells	45	—12	25.5	0.99	10.6
New Hampshire.					
Alstead[*3]	50	—12	20.6	2.67	22.2
Berlin Mills	50	—29	9.5	2.50	24.0
Bethlehem	53	—20	16.4	2.54	21.5
Brookline[*1]	54	— 8	23.5	3.99	24.5
Concord	52	— 7	24.0	3.72	27.0
Durham	55	— 8	24.9	4.84	16.8
Grafton†	55	—13	20.0	2.85	22.0
New Hampshire—Con'd.					
Hanover	51	—12	19.2	2.88	24.5
Keene	53	— 8	21.8	2.55	17.2
Lancaster	50	—20	15.1	2.94	21.5
Nashua	55	— 7	23.7	4.19	19.8
Newton†	56	— 6	24.4	4.05	19.0
North Conway	52	—15	20.0	5.24	28.5
Peterboro	55	—12	21.5	3.35	24.4
Plymouth	43	—13	17.6	3.27	25.5
Sanbornton†	58	—12	19.9	3.30	25.0
Stratford	51	—18	18.2	2.23	12.5
Warner				3.24	26.0
West Milan	48	—24	13.8	2.95	23.5
New Jersey.					
Allaire	56	4	31.5		
Asbury Park	49	6	27.3	3.48	15.0
Barnegat	64[e]	5[e]	31.9[e]	3.20	14.0
Bayonne	52	8	30.0	2.93	13.1
Beachhaven	50	8	30.4	2.14	7.2
Belvidere	57	2	27.0	2.57	9.8
Beverly†	61	4	29.8	2.32	11.3
Billingsport[*1]	60	7	28.3	2.48	8.0
Blairstown	56	3	27.8	2.26	10.0
Boonton	52	0	26.3	2.67	5.8
Bridgeton	60	10	32.2	2.33	7.0
Camden	61	6	28.8	2.11	8.1
Cape May	52	10	32.5	2.66	10.0
Cape May C. H.†	57	9	32.6	2.92	15.0
Charlotteburg	52	3	27.0	3.38	7.0
Chester	53	0	24.6	3.15	13.0
Clayton	61	6	30.2	2.25	7.0
College Farm†	58	5	29.4	2.39	14.3
Deckertown	57	— 2	27.1	1.70	8.0
Dover	54	1	27.3	3.39	11.0
Egg Harbor City	60	5	29.2	2.36	9.5
Egg Island				1.81	6.3
Elizabeth†	54	3	29.0	3.67	23.0
Englewood	53	0	27.6	4.21	15.1
Franklin Furnace	57	— 6	24.9	2.18	8.0
Freehold	58	6	29.6	2.35	6.0
Friesburg				2.00	7.3
Gillette	55	7	27.0	3.51	12.5
Hammonton				3.00	12.0
Hanover	51	4	28.6	3.05	8.0
Hightstown	60	4	28.4	2.87	13.5
Imlaystown	62	5	29.4	2.88	12.5
Junction				2.67	13.5
Lambertville	59	5	28.6	3.20	17.2
Moorestown	61	6	30.2	2.41	10.8
Newark *a*	53	7	30.1	2.74	11.0
Newark *b*†	51	5	29.0	3.19	12.0
New Brunswick *a*	58	3	29.6	2.51	12.7
New Brunswick *b*	58	2	28.6	2.32	14.5
Newton	55	2	26.0	2.10	8.0
Ocean City	51	8	31.1	2.70	7.5
Oceanic	56	8	31.8	3.14	18.6
Paterson	53	7	30.4	3.46	11.0
Perth Amboy[h]	51	4	26.8	1.98	10.0
Plainfield	56	3	28.8	2.70	12.8
Rancocas				2.55	12.8
Readington[*†]	54[e]	6	31.7		
Rivervale	54	2	28.2	3.57	15.0
Sergeantsville	54	4	27.6	2.66	14.0
Somerville	58	— 2	27.7	3.03	14.2
South Orange	54	4	28.2	3.62	12.5
Staffordville				3.56	19.5
Toms River	60	— 3	29.2	3.21	16.0
Trenton	62	5	32.8	2.06	12.0
Vineland	61	1	30.4	2.38	7.0
Woodbine	60	4	28.3	2.63	9.0
New Mexico.					
Albert†	54	2	31.4	0.45	4.5
Albuquerque†	53	2	31.4	0.57	3.2
Angus V. V. Ranch	50	2	28.0	2.30	20.5
Aztec†	50	5	27.2	1.21	6.5
Bernalillo†	58	5	33.2		
Bluewater†	52	0	28.2	0.10	T.
Buckmans	45	—23	15.3	1.88	23.5
Chama†	61	—14	25.2	2.58	25.5
Clayton	63	3	31.6	0.38	3.8
Deming[*3]	70	10	41.1	1.55	5.0
East Lasvegas†	60	— 3	29.7	0.69	9.0
Engle†	56	0	32.4	0.40	4.0
Espanola†	49	3	29.0	0.32	3.0
Estalina Springs				1.14	9.8
Fort Bayard	62	11	36.4	1.10	2.5
Fort Union	55	1	28.6	0.20	2.0
Fort Wingate	66	2	31.0	0.41	
Galisteo†	46	—17	26.3	1.45	12.0
Gallinas Spring†	59	—15	28.6	1.07	15.0
Gila	65	16	39.6	2.11	2.6
Gold Hill†	65	— 8	22.1		24.0
Hillsboro†	57	14	36.9	0.92	5.2
Labelle†	50	—16	20.6	1.15	11.0
Las Cruces†	68	9	38.9	0.35	
Lordsburg[*3]	59	20	39.6	1.21	2.0
Los Lunas†	57	—11	31.1	1.45	12.0

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New Mexico—Cont'd.	°	°	°	*Ins*	*Ins.*
Lower Penasco†	59	— 3	33.1	1.40	14.0
Monero†	43	—13	20.8	1.37	13.5
Ocate†	50	—11	21.4	0.65	6.5
Puerto de Luna†	58	— 9	31.0	1.70	17.0
Raton†	75	4	33.3	0.20	2.0
Rincon†	62	15	39.4	1.23	5.0
Roswell†	62	— 4	31.7	1.12	8.0
San Marcial†	61	— 4	34.8	0.58	4.5
Shattucks Ranch	76	0	34.8	1.38	11.0
Socorro†	62	— 9	32.2	0.51	3.0
Springer†	43	—11	19.2	0.50	5.0
Valley Ranch	57	— 7	29.0	0.50	5.0
White Oaks†	50	3	29.4	2.32	16.5
Winsors Ranch				1.35	14.0
New York.					
Adams				1.53	
Addison	59	— 5	24.0	1.54	8.0
Akron				2.48	
Angelica†	58	—20	19.2	3.12	20.0
Appleton	59	1	24.8	1.42	14.3
Arcade	55	— 7	20.1	2.70	18.5
Atlanta				1.72	
Avon	60	— 8	23.4	1.97	
Baldwinsville	59	— 3	22.4	5.40	44.5
Bedford	54	4	27.8	3.92	16.2
Big Sandy*10	60	—11	20.0		
Binghamton†	55	— 2	23.7	1.45	8.5
Bolivar	59	—16	19.8	2.31	1.55
Boyds Corners				4.07	
Brentwood	57	0	28.2	4.40	19.7
Brooklyn	51	6	28.8	4.14	23.0
Canajoharie	51	— 7	23.0	0.60	10.5
Carmel	54	3	25.7	3.45	13.0
Catskill	51	1	25.6	2.68	13.5
Charlotte*10	60	2	25.1		
Cherry Creek				4.06	
Cooperstown†	55	— 6	21.0	1.72	12.5
Cortland	52	— 6	21.4	2.68	4.0
De Kalb Junction				2.47	
Demster				4.96	
Eagle Mills				0.60	
Easton				2.51	
Elmira†	58	1	24.7	1.40	
Fleming	59	0	24.0	1.90	16.0
Fort Niagara†	60	— 1	25.9	0.96	10.0
Franklinville	56	—21	19.6	2.54	26.5
Friendship	59	—17	20.6	2.29	15.4
Fulton				4.41	
Garrattsville	56	— 6	22.5	3.15	13.5
Glens Falls	52	—10	20.8	2.37	16.5
Gloversville	49	—11	20.2	2.48	22.4
Huskinsville				1.56	
Honeymead Brook	55	1	24.4	2.36	7.1
Humphrey†	54	— 3	21.6	3.06	26.5
Ithaca	55	— 6	23.7	1.50	11.7
Jamestown	57	— 7	22.4	4.29	32.5
Kings Station				2.20	
Lake George	52	—14	21.7	2.19	16.5
Lebanon Springs	56	— 9	22.6	2.99	21.2
Little Falls	55	—12	18.4	1.01	
Lockport	60	— 2	25.8	1.87	17.5
Lowville	54	—25	18.4	2.72	30.0
Lyons	60	2	24.8	2.27	14.5
Madison Barracks†	59	—21	19.4	1.29	14.8
Manhattan Beach†	48	4	27.2	2.82	16.0
Mohonk Lake	51	0	23.2	1.89	12.0
Mount Morris				1.40	9.0
New Lisbon	58	— 7	20.3	1.14	11.5
Niagara Falls				1.87	
North Hammond†	54	—24	20.1	1.47	19.2
Number Four†	53	—26	17.0	3.16	31.1
Ogdensburg	62	—26	19.7	1.65	13.0
Oneonta	57	0	26.2	1.22	
Oxford	53	— 3	22.6	1.76	12.8
Palermo†	57	— 9	20.6	6.78	59.8
Perry City	58	—13	21.0	1.81	14.2
Phœnix				3.83	
Pine City				1.29	
Pittsford	60	— 1	24.0	1.83	
Plattsburg Barracks†	54	—18	16.6	2.98	
Port Jervis	57	0	25.1	2.91	12.5
Potsdam	58	—24	16.6	2.70	27.0
Poughkeepsie	53	— 7	25.0	1.62	7.5
Primrose	55	6	28.5	3.26	13.5
Ridgeway				1.10	
Rome	55	— 9	19.2	3.10	
Romulus	59	— 2	24.8	0.97	3.9
Rose				2.68	
St. Johnsville	52	— 9	20.0	1.14	8.4
Saranac Lake	55	—26	13.9	2.48	27.0
Setauket†	56	9	30.2	3.85	21.0
Sherwood				2.34	
Skaneateles				1.77	
South Canisteo	59	— 9	21.2	2.34	15.0
Southeast Reservoir				3.55	
South Kortright†	56	— 8	21.7	0.94	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New York—Cont'd.	°	°	°	*Ins.*	*Ins.*
Straits Corners	54	— 4	22.2	1.31	13.5
Wappingers Falls	54	—12	26.0	2.77	17.0
Warwick				1.13	
Watertown	59	—16	20.4	2.46	
Waverly†	58	— 1	24.2	1.72	8.8
Wedgwood	55	— 3	21.5	1.85	13.5
Westfield	61	0	24.8	1.93	13.0
Westpoint†	51	5	25.2	3.05	14.5
Willetspoint	56	7	28.4	3.54	8.4
North Carolina.					
Asheville†	56	— 2	32.9	1.78	3.1
Beaufort†	70	15	44.8	1.91	
Biltmore†	59	— 2	33.6	1.77	1.6
Bryson City†				3.88	6.0
Chapelhill†	69	7	35.7	2.66	7.0
Edenton†	70	12	39.9	0.98	0.5
Experimental Farm	68	10	37.8	2.12	4.0
Fairbluff†				1.63	T.
Falkland				0.92	2.0
Fayetteville†	70	10	39.6	1.31	
Greensboro†	65	6	37.9	2.15	
Henderson†	67	8	35.9	2.25	6.0
Highlands	56	—10	30.6	5.04	5.2
Horse Cove†	54	— 5	34.1	4.78	4.0
Jacksonville†	71			2.24	
Lenoir*†	58	0	35.4	2.83	6.0
Linville†	50	— 7	27.8	3.98	12.0
Littleton†	67	8	35.0	1.25	2.8
Louisburg†	67	8	36.4	2.06	5.0
Lynn*†	65		34.8	3.29	1.8
Marion	65	1	37.3	3.26	7.0
Mocksville	66	4	38.2	2.42	6.2
Moncure†	70	12	38.8	1.46	4.0
Monroe†	65	7	38.5	2.27	1.0
Morganton*†	62	5	32.5	3.40	
Mountainy†	63	1	33.2	2.57	7.6
Mount Pleasant	63	6	37.2	2.63	1.2
Murphy†				3.56	3.5
Newbern†	74	16	46.8	1.74	
Oakridge†	64	0	34.4	1.87	7.0
Pantego				1.16	1.0
Pittsboro†	67	7	35.4	4.53	5.0
Rockingham†	68	10	41.0	1.40	2.0
Roxboro†[5]	65	4	33.8	2.27	6.0
Salem†	65	3	34.7	2.99	6.5
Salisbury†	64	7	38.0	2.71	2.5
Saxon†	66	0	33.4	1.75	9.0
Selma	69	12	38.5	2.20	4.0
Settle	62	— 2	32.8	2.22	6.9
Skyuka	66	— 4	37.1	4.31	T.
Sloan†	70	13	42.1	1.31	0.1
Soapstone Mount†				2.93	6.5
Southern Pines *a*†	71	10	41.1	1.39	1.5
Southern Pines *b*	69	10	39.8	1.68	2.5
Southport†	67	13	44.2	2.07	T.
Springhope*[1]	66	11	36.5	1.30	3.0
Tarboro	69	7	37.8	1.92	1.0
Wash Woods†				1.75	T.
Waynesville†	57	—12	33.0	2.93	4.6
Weldon†	67	10	36.0	2.25	2.5
Willeyton	69	10	37.0	1.34	4.0
North Dakota.					
Amenia	38	—31	1.4	0.70	7.0
Ashley	36	—30	5.0	0.75	7.5
Buxton	37	—30	0.8	1.25	9.9
Churchs Ferry	35	—36	—0.2	1.70	7.0
Coalharbor†	40	—30	3.1	0.62	6.2
Devils Lake	48	—34	7.0	0.34	3.4
Dickinson†	38	—31	8.4	1.50	15.0
Falconer	43	—30	4.4		
Fargo†	35	—33	—0.8	0.36	0.3
Forman†	41	—28	4.8	2.04	21.0
Fort Berthold	51	—31	11.0	1.87	18.7
Fort Yates†	46	—38	9.2	1.10	11.0
Gallatin†	38	—36	2.0	0.55	3.5
Grafton†	38	—29	—0.6	1.60	16.0
Grand Rapids†	38	—31	3.8	0.96	9.1
Hamilton	38	—32	—1.4	2.04	13.4
Jamestown†	40	—26	6.0	1.10	11.0
Kelso	40	—29	3.2		
Larimore	36	—31	1.6	0.29	2.9
McKinney	36	—35	1.8	0.40	4.0
Mayville	39	—28	5.6	0.60	6.0
Medora†	43	—37	10.4	0.40	4.0
Milton†	22	—37	—1.1	0.65	6.5
Minot	44	—29	4.0	0.44	4.2
Minto†	36	—34	—0.8	1.03	10.3
Napoleon†	35	—30	3.8	0.75	7.5
New England City†				1.00	10.0
Oakdale†	49	—32	11.2	0.70	7.0
Portal†	35	—34	2.9	0.07	0.7
Power†	38	—33	0.0	0.65	6.5
St. John	33	—32	2.7	0.90	9.0
Sheyenne	35	—32	2.6	0.31	1.1
Steele	39	—30	4.0	0.24	2.4
Towner†	35	—32	—0.2		

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
North Dakota—Cont'd.	°	°	°	*Ins.*	*Ins.*
University†	37	—30	—0.7	0.65	4.5
Valley City†	33	—37	—1.0	0.90	9.0
Wahpeton†	38	—29	3.6	0.42	4.2
White Earth	36	—33	4.9	T.	T.
Wildrice*†			2.2	0.76	5.3
Willow City†	35	—34	1.0	T.	T.
Woodbridge†	36	—32	—0.2	0.69	6.9
Ohio.					
Akron	60	—14	24.4	1.92	13.8
Annapolis	62	—17	24.6		
Ashland	60	—15	22.8	2.33	20.1
Ashtabula	61	— 8	24.8	5.05	36.0
Atwater				2.50	16.0
Auburn		—16		1.58	11.5
Bangorville	60	—20	23.2	2.53	15.0
Basil				1.71	3.0
Bellefontaine	61	—20	25.2	1.86	11.4
Benton Ridge	61	—19	23.9	2.66	25.4
Bethany	62	—10	28.8	2.72	4.5
Bigprairie	61	—15	23.0	3.45	27.5
Binoia	61	—17	26.7	1.78	17.2
Bissells	58	—18	23.2	2.18	30.8
Bladensburg	66	—17	24.7	1.57	5.8
Bloomingburg	67	—14	26.6	1.32	4.0
Bowling Green	60	—20	22.8	1.83	14.5
Cambridge	62	—13	25.6	1.96	10.9
Camp Dennison	66	— 9	28.4	2.51	6.5
Canal Dover	62	—21	24.2	2.14	14.5
Canfield				1.44	11.4
Canton†	62	—13	25.5	2.09	13.5
Carrollton	62	—17	23.2	2.66	15.0
Cedarville				2.42	7.0
Celina	62	—16	28.0	0.67	6.2
Cherryfork	69	—13	27.0	2.60	11.0
Circleville	70	—11	29.8	1.37	3.0
Clarksville	64	—12	26.2	2.00	4.6
Cleveland *a*	61	—14	25.2	1.97	12.0
Cleveland *b*	61	—15	24.0	1.58	18.2
Clifton	63	—14	25.6	2.25	7.6
Coalton	66	—10	29.2	1.60	5.0
Colebrook	59	—18	23.2	1.74	14.0
Dayton *a*	65	—12	27.7	2.07	9.9
Dayton *b*†				1.90	5.0
Defiance	61	—18	22.7	2.47	10.2
Delaware†	61	—12	26.7	1.44	4.0
Demos	61	—12	24.0	0.75	6.5
Dupont	62	—18	22.9	3.11	19.5
Elyria	61	—16	24.1	1.47	7.7
Fairport Harbor*10	62	— 8	27.0		
Fayetteville	64	—13	27.1	2.59	8.6
Findlay	60	—19	23.7	2.30	17.8
Fostoria	69	—20	23.5	3.60	14.0
Frankfort	65	—10	27.6	1.59	3.0
Garrettsville†	60	—16	22.6	2.62	18.4
Granville	63	—13	25.2	1.96	6.5
Gratiot	62	—12	25.4	1.25	7.6
Greenfield	62	— 9	26.6	1.31	3.0
Greenhill	61	—18	22.9	1.45	13.4
Greenville	61	—15	24.2	1.86	5.2
Hackney				1.53	6.5
Hanging Rock	68	— 6	29.6	2.55	4.5
Hedges	61	—21	23.3	3.05	16.2
Hillhouse	61	—15	22.8	2.62	36.5
Hillsboro†	69	—13	28.2	1.88	5.0
Hiram	59	—19	21.4	2.00	18.0
Hudson	60	—20	22.6	3.51	20.5
Jacksonboro	64	—13	25.9	2.60	14.0
Kenton†	58	—18	24.4	2.38	10.2
Killbuck	63	—19	23.5	2.12	14.0
Lancaster	62	—11	25.9	1.39	3.5
Leipsic	61	—21	23.2	2.89	18.5
Levering	60	—27	21.4	1.78	
Logan	60	—12	26.2	1.38	3.8
Lordstown	61	—17	23.0	2.07	13.5
Lowell	62	—13	28.5	1.73	3.7
McArthur	66	—13	26.9	1.75	5.0
McConnelsville†	65	—11	27.3	2.21	8.0
Mansfield				2.30	18.0
Marietta *a*†				1.62	3.0
Marietta *b*	65	— 8	30.2	1.51	4.0
Marion	63	—16	20.6	1.05	8.4
Medina	61	—17	23.6	2.27	16.0
Milfordton	61	—18	20.7	1.64	7.3
Milligan	65	—13	27.2	1.47	8.0
Millport				2.33	14.0
Montpelier	57	—18	25.2	2.53	13.0
Napoleon	59	—19	22.0	1.60	10.5
Neapolis				2.15	12.8
New Alexandria	61	—12	25.8	2.05	10.0
New Berlin	60	—17	23.0	1.37	14.5
New Bremen	62	—19	22.6	1.66	3.6
New Comerstown	62	—11	25.6	1.92	8.0
New Holland	64	—11	26.0	2.25	9.9
New Moscow				1.90	9.5
New Paris	61	—16	24.1	1.78	7.0
New Waterford				1.88	15.0

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
North Lewisburg	61	−17	24.2	2.14	11.0
North Royalton	60	−18	23.5	2.34	11.0
Norwalk	61	−22	23.6	1.80	11.0
Oberlin	60*	−18*	21.9*	1.94	14.5
Ohio State University	64	−12	25.2	1.00	3.0
Orangeville	59	−20	22.1	1.84	20.0
Ottawa	61	−18	25.4	3.38	14.6
Pataskala†	63	−13	25.8	1.80	7.1
Perry				2.67	23.0
Philo	68	−13	24.6	1.04	3.5
Plattsburg	62	−14	25.4	2.41	11.0
Pomeroy	64	− 8	28.6	1.52	4.4
Portsmouth *b*	70	− 6	31.3	2.75	5.8
Richwood				1.37	3.0
Ridgeville Corners	59	−21	22.7	2.06	13.0
Ripley	62	−10	28.6	2.42	6.7
Rittman	60	−18	22.8	1.64	13.5
Rockyridge	60	−19	23.6	0.95	5.3
Rosewood	62	−15	24.5	1.10	7.0
Sharon Center	61	− 5	26.8	1.68	15.5
Shenandoah	60	−21	22.6	1.70	10.1
Sidney *b*	62	−14	24.2	2.05	9.3
Sinking Spring†	64	−10	28.2	2.33	6.0
Springboro				1.75	3.0
Spring Valley	64	−13	24.6	2.17	4.0
Strongsville				1.79	8.0
Sylvania	59	−19	21.8	2.91	16.5
Thurman	69	−10	29.6	1.16	6.0
Tiffin†	61	−16	24.9	2.65	19.5
Upper Sandusky	60	−15	24.3	2.15	17.8
Urbana	61	−14	24.2	1.70	8.9
Vanceburg	69	− 7	30.4	1.98	2.8
Van Wert	60	−19	22.2	2.19	12.0
Vermilion	61	−17	23.7	3.51	27.0
Vickery	63	−16	24.4	2.00	13.1
Walnut				1.68	5.4
Warren	60	−14	23.2	2.59	18.4
Warsaw	60	−18	25.4	0.67	5.2
Wauseon	58	−21	22.8	3.76	18.5
Waverly	64	−10	28.5	1.70	3.4
Waynesville	61	−14	24.8	2.51	8.0
Wellington	58	−17	24.8	0.82	7.0
Westerville	64	−10	27.2	1.77	5.9
Willoughby				2.55	26.5
Wooster *a*	61	−18	23.6	3.42	20.5
Wooster *b*†				1.96	14.2
Youngstown	56	−15	22.8	0.76	3.9
Oklahoma.					
Anadarko†*	77	1	36.0	0.60	10.0
Arapaho†	57	3	31.0	1.56	7.4
Beaver†	48	− 6	25.9	1.55	16.3
Burnett†	67	1	33.7	1.75	6.5
Clifton†	66	− 2	33.0	1.19	5.0
Edmond	63	1	32.0	0.86	4.0
Fort Reno†	62	2	33.4	1.00	6.0
Fort Sill	64	5	35.1	1.50	4.4
Guthrie†	65	0	35.7	1.06	2.5
Hennessey†				0.58	3.0
Mangum†	70	6	36.6	1.82	8.5
Norman†	63	2	35.0	1.22	3.0
Ponca	55			1.68	7.0
Pondcreek†	72	− 2	36.6	0.91	4.0
Prudence†	61*	− 5*	33.6*	1.65	8.7
Sac and Fox Agency†	68	0	33.6	1.40	6.0
Stillwater†	64	3	34.0	0.81	0.5
Waukomis	60	1	33.0	0.78	3.5
Winnview †*	59	0	32.2	1.56	7.9
Woodward				2.22	22.2
Oregon.					
Albany *a*	59	23	41.1	3.19	4.2
Arlington**	62	0	33.0	1.21	6.6
Ashland *b*	60	22	36.8	0.75	2.4
Aurora**	62	26	54.0	3.42	3.5
Aurora (near)	57	21	38.4	3.21	4.0
Bandon	56	30	47.2	1.35	
Bay City†	63	25	44.5	6.31	
Brownsville**	54	18	39.0	1.84	0.5
Burns†	50	− 7	21.9	1.10	9.0
Cascade Locks	54	18	36.6	6.30	5.5
Comstock**	59	27	40.9	3.58	
Corvallis *a*	58	22	38.6	2.84	0.7
Dayville†	64	− 5	34.8	1.23	2.5
Eugene *a*†	59	24	40.0	4.34	1.5
Falls City				6.47	2.6
Fife†	52	9	30.4	1.80	8.0
Forest Grove	57	19	38.0	4.10	
Fort Klamath	42	2	26.2	2.68	20.6
Gardiner	62	31	46.2	4.88	
Glenora	55	21	38.6	12.89	0.5
Government Camp	59	2	30.4	6.30	33.0
Grants Pass *a*†	61	28*	39.1*	1.90	1.0
Happy Valley	54	4	28.0	1.32	4.5
Hood River (near)	56	8	33.6	2.85	19.5
Irvington				3.90	
Jacksonville	52	21	36.7	1.03	2.0
Joseph	49	−14	23.1	1.00	10.0
Oregon—Cont'd.					
Junction City**	68	26	43.3	2.60	
Lafayette**	58	25	39.5	1.95	2.5
Lakeview†	50	9	31.6	1.13	8.5
Langlois	61	31	49.2	5.30	
McMinnville†	56	22	38.4	3.82	4.5
Merlin**	64	26	37.0	2.15	1.0
Monmouth**	58	23	39.5	2.87	2.2
Mount Angel†	58	22	39.0	2.88	3.0
Nehalem				10.43	2.5
Newberg	59	22	39.3	3.84	2.0
Newport	57	17	44.0	4.99	
Pendleton	67	− 9	32.1	1.88	*11.1
Prineville	68	10	34.6	1.20	3.9
Riddles**	60	33	41.5	1.36	0.5
Salem *b*†	58	24	39.8	2.79	1.0
Sheridan**	57	25	40.1	4.17	2.5
Silver Lake	49	0	28.8	0.25	2.0
Silverton**	56	20	37.9	4.07	1.1
Siskiyou**	52	25	37.4		10.0
Sparta	47	− 7	25.9	2.04	20.0
Springfield**	58	24	39.8	2.32	2.0
Stafford	58	20	37.4	4.05	3.0
The Dalles†	65	9	35.6	1.14	8.8
Toledo	59	21	44.7	5.13	
Vale	46	− 2	28.5	1.78	7.0
Vernonia	55	15	37.6	3.48	4.0
West Fork**	56	30	41.8	1.68	
Weston	60	− 7	28.0	2.55	13.0
Williams	59	25	38.7	1.46	
Pennsylvania.					
Altoona	60	1	31.0	0.95	
Aqueduct	63	0	29.0	1.50	7.8
Bethlehem				2.35	12.0
Blooming Grove	52	− 5	22.2	3.25	20.0
Brookville†				2.04	16.2
Browers Lock				2.00	
Cameron				1.45	8.0
Canonsburg	74	− 8	27.6	1.53	4.8
Carlisle	64	4	27.3	1.77	9.3
Cassandra	56	−10	24.2	3.18	20.5
Cedarrun				1.48	11.2
Centerhall†	56	− 5	23.6	2.20	14.0
Chambersburg†	65	− 3	25.0	1.84	5.8
Coatesville	60	3	28.2	2.79	15.0
Confluence†	72	−10	24.2	3.54	21.0
Coopersburg	58	3	29.8	2.62	8.8
Davis Island Dam†				1.12	
Derry Station*	61	− 7	27.1	2.10	8.5
Doylestown				1.89	
Drifton	53[4]	− 4[4]	23.2[4]	1.52	15.2
Driftwood				2.18	3.0
Dubois				2.18	19.2
Duncannon				3.40	6.3
Dunmore	58	− 6	26.0	1.54	9.8
Dyberry†	54	− 5	22.2	1.36	11.5
East Bloomsburg				1.13	4.3
East Mauch Chunk	58	1	25.6	2.96	9.2
Easton	55	1	27.6	1.80	9.9
Edinboro*1	52	−12	21.9		20.0
Ellwood Junction†				1.68	11.0
Emporium	59	−13	24.0	2.30	9.2
Farrandsville				1.71	7.0
Forks of Neshaminy*1	54	8	29.4	3.39	15.5
Franklin	60	−12	20.2	1.95	13.9
Frederick				1.81	
Freeport†				2.02	8.0
Gettysburg	64	3	28.8		
Girardville				2.59	16.0
Grampian	58	−10	21.0	2.15	14.0
Greensboro†	65	−15	25.7	1.86	7.0
Hallstead†	57	− 2	24.6	2.46	19.6
Hamburg	59	2	28.4	2.50	7.5
Hollidaysburg	59	− 7	25.3	2.40	10.8
Huntingdon *a*†	60	− 4	27.0	1.65	4.8
Huntingdon *b*				1.64	9.8
Indiana	67	− 9	26.8	2.56	7.3
Irwin	72	− 4	30.4	1.44	4.5
Johnstown†	62	− 8	25.0	2.92	18.0
Karthaus				1.25	7.0
Keating				1.81	6.9
Kennett Square	58	4	29.0	2.78	11.2
Lancaster*	60	2	25.2		7.0
Lansdale				1.85	
Lawrenceville	57	− 9	23.6	0.90	4.5
Lebanon	61	4	27.5	2.26	9.6
Leroy†	55	− 5	21.6	2.13	11.1
Lewisburg	60	− 1	26.5	3.26	11.5
Lock Haven *a*†	61	− 2	27.6	1.66	9.0
Lock Haven *b*				1.67	9.0
Lock No. 4†				1.53	5.0
Lycippus	66	− 9	25.4	2.43	16.0
Mifflin				2.45	6.0
Oil City†				2.59	18.6
Ottsville				2.44	
Parker†				2.24	9.0
Philadelphia *b*	61	8	31.2	2.25	9.3
Pennsylvania—Cont'd.					
Point Pleasant				1.82	
Pottstown	60	4	28.0	2.90	14.0
Quakertown	57	2	26.4	3.01	13.0
Reading[2]			27.4	1.69	
Renovo *a*				1.75	11.0
Renovo *b*	62	− 5	25.2	2.01	9.1
Ridgway†				1.72	12.6
Saegerstown	61	−25	21.2	3.36	23.0
St. Marys	55	− 9	21.8	1.89	7.5
Salem Corners	52	− 2	23.5	1.93	13.2
Scranton	58	0	25.7	1.48	6.0
Selsholtzville				2.28	
Selinsgrove	56	− 1	27.6	1.85	11.5
Shawmont				2.94	12.4
Shinglehouse	56	−16	22.0	2.43	10.2
Sinnamahoning				2.00	
Skippack	60	− 1	28.0	3.07	12.8
Smethport	57	−16	21.9	1.60	7.5
Smiths Corners				2.14	
Somerset	50	−12	19.6	3.01	18.5
South Bethlehem	56	3	29.0		
South Eaton	57	3	26.5	1.89	6.5
State College	59	− 5	23.0	2.21	8.0
Sunbury				1.95	
Swarthmore	59	6	28.6	2.99	10.5
Towanda	58	1	25.2	1.21	6.5
Uniontown	68	− 6	28.0	1.93	15.0
Warren†	59	−13	23.2	2.27	16.0
Wellsboro†	64	− 3	24.1	2.23	14.0
West Chester	58	4	28.6	2.33	8.5
West Newton†				1.92	9.0
Westtown	57	4	26.8	2.64	9.8
White Haven	54	− 4	24.2	1.80	9.3
Wilkesbarre†	61	3	29.1	1.40	6.0
Williamsport	60	0	25.8	1.45	7.5
York†	62	1	27.9	1.55	11.5
Rhode Island.					
Bristol	54	5	27.6	3.76	15.0
Kingston	54	1	26.4	5.19	19.5
Lonsdale				4.94	18.0
Pawtucket	53	4	30.2	5.45	14.8
Providence *a*	56	6	28.2	6.34	20.0
Providence *c*	54	2	26.8	5.16	19.5
South Carolina.					
Anderson†				3.85	T.
Batesburg†	69	11	43.8		
Blackville†	70	12	43.8	2.53	
Camden†				1.73	
Central†	63	5	38.6		
Cheraw *a*†	70	9	39.6	0.87	T.
Cheraw *b*†				0.99	0.2
Clemson College	66	5	38.8	3.72	2.0
Conway†				2.09	
Darlington (near)				1.85	
Edisto†				1.99	
Effingham†				1.64	
Florence†	71	9	40.6	1.74	
Georgetown†	69	15	44.2	1.30	
Gillisonville†	73	10	46.2	1.27	
Greenville†	66	6	37.4	3.45	
Greenwood				4.25	
Holland	66	5	39.6	4.80	0.1
Kingstree *a*†	73	11	42.8	2.16	
Kingstree *b*†				2.16	
Little Mountain	72	9	43.5	3.43	T.
Longshore†	68	10	40.8	3.26	T.
Mount Carmel†				3.93	T.
Pinopolis*1	69	17	45.0	2.00	
Port Royal†	67	18	47.4	1.34	
St. George†	70	14	44.4	1.95	
St. Matthews†	69	13	43.4	1.77	
St. Stephens†				2.75	
Santuck†	65	9	38.8	2.79	T.
Shaws Fork*1	68	14	44.4	1.94	
Smiths Mills†				2.15	
Society Hill†	69	12	41.1	0.94	0.5
Spartanburg†	65	9	38.8	2.59	T.
Statesburg†	68	12	42.8	2.05	T.
Trenton	64	12	45.2	3.59	T.
Trial†	72	13	44.9	2.61	
Walhalla	61	3	37.4	4.00	1.2
Winnsboro	66	9	38.8	2.59	T.
Yemassee†	76	16	46.9	1.16	
Yorkville	65	9	40.3	2.65	1.5
South Dakota.					
Aberdeen†	39	−34	5.8	5.45	26.0
Alexandria†	41	−27	7.8	2.28	13.5
Armour†	43	−25	11.4	2.66	19.0
Ashcroft†	53	−25	17.5	0.60	6.0
Brookings	40	−30	6.6	1.60	16.0
Canton	40	−27	10.6	1.72	10.0
Castlewood†	35	−30	4.6	2.45	19.0
Chamberlain†	46	−30	14.0	0.39	5.8
Cross†	62	−21	22.0	0.70	9.6
Doland	33	−30	6.4	4.49	17.5
Edgemont				0.10	1.0

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
South Dakota—Cont'd.	°	°	°	*Ins.*	*Ins.*
Farmingdale	.....	.....	.....	0.36	2.0
Faulkton *a* †	38	−29	6.6	.....	.....
Flandreau †	41	−30	7.8	1.79	15.0
Forestburg †	37	−27	9.2	2.16	21.6
Forest City †	47	−27	11.5	1.50	15.0
Fort Meade †	.....	−15	.....	1.33	10.6
Gary †	41	−28	8.2	1.95	16.5
Goudyville *†	39	−30	7.2	1.89	18.0
Greenwood †	49	−16	16.6	1.12	8.8
Hotch City †	48	−25	12.7	1.11	3.3
Hot Springs	55	−19	21.4	0.58	7.5
Howard †	37	−29	8.4	.....	.....
Kimball †	42	−24	11.0	1.80	18.0
Leslie †	53	−25	16.0	0.50	.....
Mellette †	38	−29	6.2	2.62	26.2
Menno †	41	−23	11.6	1.30	10.2
Millbank	42	−25	6.4	1.10	8.0
Mitchell †	40	−28	10.0	2.10	13.5
Nowlin †	60	−22	14.7	1.15	11.5
Oelrichs †	63	−18	20.4	1.75	17.5
Parker †	41	−27	9.1	0.60	6.0
Plankinton †	.....	−24	.....	1.89	19.0
Rosebud	60	−20	14.8	2.30	23.0
St. Lawrence †	40	−27	7.4	1.45	25.0
Shiloh	40	−30	7.2	.....	.....
Silver City	.....	.....	.....	1.07	10.3
Sioux Falls †	38	−27	8.0	2.10	21.0
Spearfish †	53	−17	22.1	2.25	10.8
Tyndall †	45	−20	15.0	1.60	16.0
Vermillion	45	−23	12.7	0.85	8.5
Watertown †	50	−35	6.4	1.00	9.0
Webster †	37	−28	5.1	5.69	33.6
Wentworth †	39	−30	6.5	1.45	14.2
Tennessee.					
Andersonville *[1]	67	− 4	34.6	1.75	2.5
Ashwood *† [1]	66	2	37.7	3.95	1.8
Bayne *[1]	65	− 7	34.2	2.03	1.5
Benton (near) †	69	− 9	38.2	1.96	3.0
Bluff City †	.....	.....	.....	2.28	5.5
Bolivar †	69	0	36.8	3.28	0.5
Bristol †	65	−15	30.9	2.17	9.2
Byrdstown	69	− 8	33.6	3.79	4.0
Cagle *[1]	68	− 1	31.9	2.96	3.0
Carthage †	.....	.....	.....	4.18	2.0
Charleston †	.....	.....	...	2.27	2.0
Charlotte	66	−13	35.0	4.67	2.0
Clarksville	66	− 2	34.6	4.37	3.0
Clinton †	.....	.....	.....	3.20	3.0
Decatur †	70	− 9	36.2	2.98	3.5
Elizabethton †	68	−13	33.5	2.31	13.0
Elk Valley *[1]	69	−10	34.3	3.48	3.0
Fairmount	.....	.....	.....	3.84	2.5
Florence †	67	− 6	36.4	3.43	1.8
Franklin	67	− 3	35.0	3.27	1.5
Greeneville †	61	− 8	34.0	2.42	3.9
Harriman	68	− 4	35.0	3.22	2.0
Hohenwald †	69	− 9	35.5	3.73	1.0
Jackson †	69	0	36.5	4.20	.....
Johnsonville †	69	− 8	36.6	3.71	0.5
Jonesboro *† [1]	58	−14	32.7	2.12	7.4
Kingston †	.....	.....	.....	3.50	3.0
Liberty †	66	−10	35.2	4.04	2.0
Loudon †	.....	.....	.....	3.19	3.0
Lynnville *† [1]	69	2	34.4	2.71	1.5
McKenzie †	66	4	36.3	4.85	1.0
McMinnville †	66	− 9	36.1	4.35	4.5
Molino †	65	− 1	37.0	3.43	3.1
Newport †	68	− 9	35.0	2.67	5.0
Nunnelly *[1]	66	−10	36.1	3.50	2.4
Palmetto †	68	− 3	37.8	2.71	2.5
Pope *[1]	68	− 8	36.1	3.55	2.5
Riddleton †	68	− 9	35.4	3.64	3.0
Rockwood †	.....	.....	.....	2.94	2.0
Rogersville †	63	− 8	33.6	3.16	4.7
Rugby	64	−17	31.4	4.20	3.5
St. Joseph †	66	− 6	37.1	4.19	1.0
Savannah	68	2	39.0	2.57	T.
Sewanee †	58	1	34.3	3.73	4.0
Strawberry Plains †	.....	.....	.....	2.53	3.0
Tellico Plains †	74	− 9	36.4	2.65	4.0
Trenton	68	1	35.3	4.67	0.5
Tullahoma †	62	−14	33.6	3.30	3.0
Union City †	67	1	35.2	5.16	1.1
Waynesboro *[1]	65	− 3	37.7	3.79	1.0
Texas.					
Albany *[1]	61	10	37.8	2.23	14.5
Arthur City †	.....	.....	.....	4.75	2.0
Ballinger †	70	9	41.2	1.17	6.7
Beeville †	79	19	50.5	1.89	6.0
Blanco †	71	12	44.2	1.27	.....
Boerne *† [1]	72	12	45.1	1.56	0.5
Bowie	68	5	39.2	2.32	7.4
Brady	73	9	40.7	1.63	7.8
Brazoria †	75	19	51.4	5.51	T.
Brenham †	76	15	49.0	4.59	0.5
Brighton †	.....	22	.....	1.85	5.5

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Texas.—Cont'd.	°	°	°	*Ins.*	*Ins.*
Brownwood *[5]	76	6	44.3	1.10	8.0
Burnet *[1]	72	8	43.1	.....	.....
Camp Eagle Pass †	80	20	51.0	0.35	
Childress *[1]	65	4	33.6	.....	2.5
Coleman *[2]	.....	8	38.8	1.54	11.0
College Station	88	14	46.6	3.85	
Colmesneil	.....	.....	.....	6.95	2.0
Columbia †	77	20	50.2	5.52	1.0
Corsicana *b* †	72	7	42.4	4.17	1.0
Cuero †	79	18	51.7	2.06	.....
Dallas †	72	8	40.9	3.22	5.2
Danevang †	75	19	50.2	4.44	
Dean	57	− 6	28.6	2.05	20.5
Dublin †	72	5	39.4	1.80	5.0
Durham	.....	.....	.....	0.50	5.0
Duval *[1]	78	15	48.6	1.17	T.
Estelle †	70	6	39.8	4.66	13.5
Forestburg †	70	8	39.5	1.27	3.0
Fort Clark	74	14	47.8	1.78	.....
Fort McIntosh	75	21	48.8	1.10	3.8
Fort Ringgold †	81	23	52.6	1.82	.....
Fort Stockton	.....	.....	.....	0.45	1.9
Fort Worth †	69[2]	10[2]	40.8[2]	3.14	13.3
Fredericksburg *† [1]	72[1]	13[1]	52.7[1]	1.65	.....
Gainesville †	68	7	39.4	3.84	9.2
Georgetown *[1c]	72	11	42.0	.....	.....
Golindo	.....	.....	.....	3.60	.....
Graham	60	0	37.3	1.31	6.7
Grapevine †	69	9	40.5	2.99	12.0
Hale Center †	60	7	35.9	1.30	12.0
Hallettsville †	77	17	49.2	2.61	1.5
Hewitt	.....	.....	.....	3.00	1.0
Houston †	76	19	49.6	5.93	1.0
Huntsville †	72	14	44.8	4.55	
Kent	.....	.....	.....	0.69	6.0
Kerrville †	73	12	42.8	0.64	2.1
Lampasas †	71	11	43.8	2.18	1.5
Liano *† [5]	72	15	45.2	0.95	T.
Longview †	73	12	45.3	5.19	.....
Luling †	76	17	49.5	1.37	
Mann	.....	10	... ...	4.49	1.0
Menardville †	75	7	40.0	0.53	2.0
Moore Station	80	19	48.7	1.22	2.2
Mount Blanco †	64	− 2	32.0	1.02	10.0
New Braunfels †	74	17	47.8	1.56	
Orange †	68	18	45.2	6.80	
Panter †	.....	.....	.....	3.14	5.5
Paris †	75	8	41.5	3.34	4.0
Point Isabel *[1]	78	28	58.6	0.70	T.
Rheinland †	68	0	37.8	1.49	4.5
Roby †	.....	2	.....	1.75	7.2
Rocksprings	.....	.....	.....	1.39	2.1
Runge †	79	14	50.6	0.76	
San Antonio	75	18	49.7	1.59	T.
Sanderson †	75	12	41.6	0.13	0.9
San Marcos *b* †	84	16	47.2	1.61	
Sierra Blanca †	73	9	41.8	0.15	1.5
Stafford †	78	18	49.0	4.99	
Sulphur Springs †	71	11	42.8	4.56	1.2
Tulia	54	− 7	27.6	1.76	17.0
Waco †	72	13	44.2	2.57	T.
Weatherford †	69	9	40.4	3.03	7.5
Wichita Falls †	.....	.....	...	1.39	5.0
Utah.					
Alpine City †	.....	.....	.....	1.38	9.5
Blue Creek *[3]	60	0	25.7	.....	10.0
Brigham City †	.....	.....	.....	2.24	.....
Cisco †	55	6	30.4	0.60	2.0
Corinne *[1]	50	− 4	28.1	1.70	17.0
Farmington	.....	.....	.....	2.35	17.0
Fillmore †	57	4	28.3	2.15	.....
Fort Duchesne †	38	−24	12.3	0.87	8.7
Giles †	46	− 6	22.1	1.10	12.0
Grover †	51	− 8	21.7	3.80	28.0
Heber	48	− 8	22.8	1.30	13.0
Huntsville †	.....	.....	.....	1.48	15.0
Kelton *[3]	44	−10	22.0	.....	9.0
Koosharem	44	− 6	20.6	.....	.....
Levan †	50	3	27.0	1.95	19.5
Loa †	50	−20	20.8	1.05	10.5
Logan †	47	−10	21.2	0.90	.....
Mammoth †	49	9	29.8	2.02	20.2
Manti †	56	−12	25.2	2.90	29.0
Millville †	.....	.....	.....	1.10	.....
Moab †	46	12	30.1	1.22	6.0
Mount Pleasant *† [1]	60	7	27.8	1.30	13.0
Ogden *[3]	47	10	29.3	.....	22.0
Ogden *b* [1]	49	10	29.5	1.80	18.0
Park City †	48	− 3	25.4	1.70	17.0
Parowan †	48	2	28.1	1.50	15.0
Promontory *[3]	43	0	25.8	.....	12.5
Provo	55	5	31.6	1.20	12.0
Richfield †	52	2	27.7	1.00	10.0
St. George †	61	8	36.8	2.66	.....
Scipio †	50	−10	25.4	2.60	10.0
Snowville †	44	− 5	23.2	1.00	10.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Utah—Cont'd.	°	°	°	*Ins.*	*Ins.*
Soldier Summit †	41	−10	18.2	1.82	18.2
Terrace *[3]	49	0	21.1	.....	9.2
Thistle *† [3]	45	− 6	24.2	1.65	16.5
Tooele †	53	8	29.6	1.15	.....
Vernal	40	− 9	20.6	0.96	12.0
Woodruff	42	−20	12.8	0.20	2.0
Vermont.					
Bennington	55	− 9	21.2	2.01	12.5
Brattleboro	49	− 4	23.8	2.93	24.0
Burlington †	57	−15	20.2	2.50	19.0
Chelsea †	52	−19	16.8	3.58	27.0
Cornwall	54	−16	19.2	2.22	17.8
Enosburg Falls	58	−22	16.8	3.45	29.0
Hartland †	51	−16	19.4	3.39	25.4
Jacksonville	50	−16	19.6	3.78	26.8
Norwich	51	−16	18.5	2.90	22.5
St. Johnsbury	42	−18	15.6	2.15	18.2
Strafford *† [1]	46	−12	17.8	3.15	27.5
Vernon *[3]	50	− 7	22.8	3.71	27.0
Wells	56	−15	19.6	3.41	27.0
Woodstock	52	−21	19.2	3.76	28.0
Virginia.					
Alexandria	66	7	30.4	1.83	5.7
Ashland †	70	2	34.8	1.52	5.0
Barboursville	64	1	30.4	1.76	7.3
Bigstone Gap †	67	−15	31.0	3.11	5.1
Birdsnest *† [1]	60	16	36.8	1.80	1.4
Blacksburg	63	− 3	29.2	1.65	6.8
Buckingham †	65	− 5	30.2	0.92	0.2
Burkes Garden	52	− 9	26.0	1.16	7.0
Callaville †	67	4	34.8	1.95	3.0
Charlottesville	64	5	33.4	2.02	6.0
Christiansburg †	.....	.....	.....	1.59	5.0
Clifton Forge	53	7	26.7	2.35	7.5
Dale Enterprise †	60	− 2	28.8	1.56	7.0
Doswell	68	3	32.4	3.15	3.8
Fredericksburg †	68	− 4	31.8	1.70	6.0
Gordonsville	65	0	32.4	.....	7.2
Goshen	59	4	33.0	.....	9.0
Grahams Forge	58	− 4	27.5	1.80	6.6
Guinea	68	− 5	30.4	3.60	6.5
Hampton	63	14	38.1	1.87	3.0
Hot Springs	51	− 3	27.8	2.15	4.5
Lexington †	60	− 1	31.8	1.76	6.7
Maidens	68	− 5	32.0	1.65	4.2
Manassas †	66	7	30.8	5.00	5.5
Marion † [4]	57	− 4	30.3	2.40	8.0
Monterey	50	0	26.6	1.33	7.0
Nottoway †	69	0	34.7	2.20	5.7
Petersburg †	70	4	35.8	1.96	6.2
Quantico	62	− 4	30.0	.....	6.2
Radford †	.....	.....	.....	1.13	7.0
Richmond (near) †	69	5	36.8	1.90	4.7
Rockymount †	62	4	35.6	2.21	6.5
Salem †	63	3	36.0	1.69	5.9
Saltville	61	− 5	32.4	1.67	6.0
Smithville †	65	6	34.6	1.87	7.5
Speers Ferry †	.....	.....	.....	2.28	3.0
Spottsville †	68	9	34.0	2.06	5.0
Stanardsville †	63	5	30.2	1.88	7.5
Stanleyton	64	5	30.7	0.90	4.0
Staunton †	60	2	31.9	0.92	6.5
Stephens City †	60	3	28.5	1.85	7.0
Sunbeam †	62	12	34.4	2.22	3.7
Warsaw †	67	3	33.7	1.99	5.0
Westbrook Farm	65	4	33.4	.....	.....
Williamsburg	.....	.....	.....	0.40	4.0
Woodstock †	63	5	30.9	1.46	6.0
Wytheville	59	− 2	20.5	1.43	7.8
Washington.					
Ashford †	.....	.....	.....	5.93	5.2
Blaine †	54	10	34.0	4.54	3.0
Bridgeport	50	8	29.2	.....	.....
Centerville †	55	− 6	29.0	1.05	8.0
Chehalis †	53	18	34.7	3.27	3.0
Clearwater	55	27	41.7	16.56	
Colfax †	55	− 7	30.6	2.07	9.6
Coupeville †	54	21	39.2	2.79	5.5
Dayton	62	1	31.5	.....	2.3
Eastsound †	55	23	40.4	2.85	1.2
Ellensburg †	47	− 7	24.6	1.62	.....
Ellensburg (near)	40	− 2	24.6	1.05	18.0
Fort Simcoe †	58	10	32.4	0.78	6.1
Fort Spokane	46	1	23.5	1.56	19.0
Grandmound †	55	5	38.0	4.84	4.0
Hunters †	39	− 7	21.2	1.11	15.0
Kennewick †	52	0	29.1	1.30	14.0
La Center	55	21	37.8	3.67	4.5
Lakeside †	45	3	27.6	1.98	8.0
Lapush †	55	24	40.4	11.40	1.0
Loomis †	43	3	27.8	0.68	7.0
Madrone *† [1]	59	14	39.3	4.34	9.0
Mayfield †	53	18	38.0	5.16	.....
Moxee Valley †	53	3	31.2	0.89	8.9
New Whatcom †	59	17	39.1	3.13	5.0
North Bend *[1]	58	23	38.2	10.07	2.0

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Washington—Cont'd.	°	°	°	*Ins.*	*Ins.*
Olga	54	25	40.9	2.75	4.0
Olympia†	56	10	39.4	5.81	1.5
Pine Hill†	56	0	34.8	2.16	16.0
Pomeroy†	54	— 1	33.0	1.70	2.8
Pullman†	49	—11	28.9	2.12	13.5
Rosalia†	46	1	28.8	1.34	5.0
Sedro†	58	18	39.8	4.91	3.0
Silvercreek*1	52	20	37.6	4.64	5.0
Snohomish†	57	17	38.8	3.40	3.0
Southbend	58	24	41.0	9.48	0.5
Stillaguamish	56	13	37.2	3.87	7.0
Sunnyside†	53	3	30.8	0.83	6.8
Tacoma†	59	16	37.7	6.92	8.0
Union City†	56	17	38.2	9.56	5.2
Vashon†	56	19	39.3	6.47	5.0
Waterville†	45	—15	20.2	2.94	16.5
West Virginia.					
Beckley	64	—18	27.8	1.25	3.5
Beverly†	62	—12	27.6	2.85	17.0
Bloomery†	58	— 3	26.2	1.27	7.5
Bluefield†	62	— 4	30.4	1.78	9.1
Buckhannon *a*†	.....	.....	.....	1.79	15.5
Burlington†	64	1	27.8	1.21	2.5
Charleston†	.....	.....	.....	2.03	3.0
Dayton†	.....	.....	.....	1.85	3.0
Elkhorn†	62	— 1	33.5	1.46	5.2
Fairmont†	.....	.....	.....	1.94	7.0
Glenville†	66	—12	27.8	1.58	1.5
Grafton†	66	—10	27.4	2.21	8.8
Green Sulphur	63	— 4	30.3	1.10	6.0
Harpers Ferry†	.....	.....	.....	1.44	6.0
Hewett†	68	— 5	28.8	1.80	7.0
Hinton *a*†	.....	.....	.....	1.55	7.0
Hinton *b*†	61	0	30.3	.....	4.5
Kingwood	62	— 9	26.0	1.92	.....
Marlinton†	57	— 8	25.1	2.17	10.0
Martinsburg†	63	3	28.7	1.05	5.0
Monarch*1	68	0	33.0	1.76	12.2
Morgantown *a*†	.....	.....	.....	1.56	8.0
Morgantown *b*†	67	—10	29.6	2.35	.....
New Martinsville†	67	— 8	29.6	1.48	4.5
Nuttallburg†	63	—11	29.4	1.50	.....
Oldfields†	61	1	27.6	1.15	3.9
Pennsboro	67	—15	28.6	1.88	6.5
Philippi†	65	—14	28.7	2.09	6.0
Point Pleasant†	69	— 6	28.8	1.89	1.0
Romney	62	3	29.6	1.37	5.0
Rowlesburg†	.....	.....	.....	2.20	14.5
Tannery*1	60	— 2	27.3	.....	12.8
Weston *a*†	.....	.....	.....	2.36	7.0
Weston *b**1	66	—11	29.0	.....	5.5
Wheeling *a*†	.....	.....	.....	1.38	8.0
Wheeling *b*†	65	— 4	29.2	1.21	7.5
White Sulphur Springs†	58	—11	29.6	0.90	6.0
Wisconsin.					
Amherst	49	—23	16.0	1.61	0.1
Apollonia *†1	47	—33	11.6	1.60	6.0
Barron	48	—35	11.4	2.03	15.5
Bayfield	42	—25	12.4	2.00	20.0
Beloit	56	—23	19.2	1.30	10.8
Boscobel†	60	—26	15.4	2.14	19.4
Butternut	59	—31	12.0	1.25	11.2
Centralia	53	—26	15.2	0.93	2.0
Chilton	54	—21	19.3	0.82	0.2
Citypoint	53	—28	12.2	1.79	2.5
Crandon†	35	—30	10.2	1.30	13.0
Delavan†	59	—26	20.0	2.59	7.8
Dodgeville†	54	—29	14.8	2.29	7.5
Easton†	55	—24	14.2	1.45	4.4
Eau Claire	54	—30	11.8	2.00	9.0
Florence†	42	—27	14.3	1.72	8.0
Fond du Lac	54	—21	19.3	1.66	1.4
Grand River Lock	.....	.....	.....	1.57	3.0
Grantsburg†	43	—36	7.4	1.35	13.5
Gratiot†	60	—24	18.9	2.30	8.5
Hartford	.....	.....	.....	3.02	5.0
Hartland	54	—20	19.1	2.84	9.0
Harvey	56	—21	19.5	3.07	8.2
Hayward†	47	—33	5.8	1.94	14.6
Hillsboro	53	—20	15.4	2.00	7.0
Hudson	62	—27	12.6	1.65	8.5
Koepenick *†1	44	—28	13.0	1.50	7.0
Wisconsin—Cont'd.	°	°	°	*Ins.*	*Ins.*
Lancaster†	60	—27	14.2	1.87	12.0
Lincoln†‡	.....	.....	20.0	2.04	3.0
Madison†	52	—23	17.6	2.22	5.7
Manitowoc†	50	—18	20.8	2.36	0.6
Meadow Valley†	53	—25	14.0	1.61	1.8
Medford†	52	—33	12.0	1.02	3.6
Menasha	.....	.....	.....	0.30	0.2
Nellisville†	54	—27	13.0	1.95	.....
New Holstein	51	—20	15.5	3.46	6.0
New London	52	—22	17.6	1.81	1.5
Oconto	49	—19	19.4	1.32	1.5
Osceola†	48	—38	7.6	2.50	13.0
Oshkosh†	53	—22	18.0	0.19	2.0
Pepin	54	—28	11.3	1.34	8.0
Pine River†	53	—25	17.6	1.66	2.2
Portage†	52	—23	15.6	1.43	2.0
Port Washington	52	—21	21.2	3.33	0.4
Prairie du Chien	66	—23	20.2	2.78	9.2
Racine	50	—19	22.1	3.25	8.0
Sharon†	57	.....	.....	4.11	18.0
Shawano	51	—20	19.4	1.76	2.5
Spooner†	46	—34	7.8	2.10	21.0
Stevens Point†	52	—25	16.2	1.51	6.5
Sturgeon Bay Canal*9	48	—20	20.0	.....	.....
Valley Junction†	59	—26	14.9	1.47	2.0
Viroqua	55	—26	14.8	2.60	5.2
Watertown†	56	—22	18.8	4.08	26.5
Waukesha†	56	—20	20.0	2.73	4.7
Waupaca†	51	—24	17.8	1.08	0.8
Wausau†	45	—27	15.0	1.83	5.5
Wausaukee	48	—29	16.2	2.10	2.0
Westbend	54	—14	21.4	3.68	4.8
Westfield†	53	—23	16.0	1.22	2.7
Whitehall	55	—26	12.6	1.65	4.0
White Mound†	60	—28	17.2	2.15	6.0
Wyoming.					
Big Horn Ranch	58	—25	21.8	0.14	3.0
Fort Laramie†	62	—22	23.9	0.29	4.5
Fort Washakie†	56	—18	16.1	0.12	1.2
Fort Yellowstone†	40	—29	15.8	1.12	11.2
Laramie	48	—30	16.4	0.39	.....
Lusk†	56	—23	19.4	0.59	.....
Sheridan	57	—32	18.4	0.40	4.0
Sundance	45	—27	16.9	2.00	20.0
Wheatland	58	—21	25.2	0.30	3.0
Mexico.					
Ciudad P. Diaz	75	22	48.6	0.36	
Leon de Aldamas	77	34	57.0	0.50	
Mexico	74	37	56.5	0.15	
Topolobampo*1	79	55	67.8	0.20	
New Brunswick.					
St. John	51	—13	18.9	5.54	27.4
West Indies.					
Grand Turk Island	.....	.....	.....	0.30	
Kansas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Hays	68	18	44.4	0.30	
Oswego	76	16	43.9	1.17	
Missouri.					
Hastain	.....	.....	.....	1.00	
Macomb	.....	.....	.....	1.10	
Potosi	61	0	33.0	.....	
Nebraska.					
Sargent	.....	.....	.....	T.	T.
Nevada.					
Tuscarora	47	11	32.9	0.42	0.5
New Jersey.					
Beachhaven‡	56	22	36.9	1.06	6.0
New Mexico.					
Angus V. V. Ranch	62	14	36.7	0.33	5.0
North Carolina.					
Morganton	.....	.....	.....	2.23	
North Dakota.					
St. John	47	—20	19.0	0.60	6.0
Oregon.					
Hood River (near)	52	12	37.9	7.17	7.0
South Dakota.					
Canton	46	2	27.4	0.24	
Millbank	47	—16	21.6	.....	.....
Rosebud	60	—10	34.3	0.85	8.5
Shiloh	50	—26	19.6	T.	
Texas.					
Henrietta	76	19	47.3	1.87	
Vermont.					
Brattleboro	48	— 7	24.8	0.85	4.2
Wyoming.					
Wheatland	60	0	32.8	0.00	

Late reports for December, 1896.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alaska.	°	°	°	*Ins.*	*Ins.*
Juneau	43	22	33.8	10.59	18.2
Arkansas.					
Helena *b*	69	22	44.6	0.64	
Hot Springs *a*	.....	.....	.....	0.64	
California.					
Hydesville	65	32	48.6	8.22	
Placerville	63	26	45.2	4.47	
Point George L. H.	.....	.....	.....	3.96	
Southeast Farallone	.....	.....	.....	4.19	
Tulare *c*	84	29	50.4	0.46	
Colorado.					
Sherwood Ranch	54	1	28.4	.....	3.0
Connecticut.					
Waterbury	54	— 8	29.2	2.39	19.0
West Simsbury	.....	.....	.....	1.54	8.5
Georgia.					
Marietta	69	18	43.2	1.45	5.0
Illinois.					
Rushville	68	6	35.6	0.67	T.
Kansas.					
Delphos*1	62	19	37.9	0.25	

EXPLANATION OF SIGNS.

* Extremes of temperature from observed readings of dry thermometer.

† Weather Bureau instruments.

‡ Record furnished by the Arrowhead Reservoir Company, in the San Bernardino Mountains, San Bernardino County, Cal., at elevations varying from 4,900 to 6,900 feet.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.
[2] Mean of 8 a. m. + 8 p. m. ÷ 2.
[3] Mean of 7 a. m. + 7 p. m. ÷ 2.
[4] Mean of 6 a. m. + 6 p. m. ÷ 2.
[5] Mean of 7 a. m. + 2 p. m. ÷ 2.
[6] Mean of readings at various hours reduced to true daily mean by special tables.
[7] Mean from hourly readings of thermograph.
[8] Mean of 7 a. m. + 2 p. m. + 9 p. m. ÷ 3.
[9] Mean of sunrise and noon.
[10] Mean of sunrise, noon, sunset, and midnight.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance, "^{a}" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks, of whatever duration, in the precipitation record receive appropriate notice.

CORRECTIONS.

Massachusetts, Bluehill (valley), December, 1896, add minimum temperature —15.

New Mexico, Clayton, December, 1896, make precipitation read 0.22 and snowfall 2.2.

North Carolina, Rutherfordton, March, 1896, strike out all data.

NOTE.—The following change has been made in the names of stations: Montana, Agricultural College, changed to Bozeman Experiment Station.

TABLE III.—*Data from Canadian stations for the month of January, 1897.*

Stations.	Pressure.			Temperature.		Precipitation.		Prevailing direction of wind.	Total depth of snow.
	Mean not reduced.	Mean reduced.	Departure from normal.	Mean.	Departure from normal.	Total.	Departure from normal.		
	Inches.	*Inches.*	*Inches.*	°	°	*Inches*	*Inches.*		
St. Johns, N. F	29.69	29.84	.00	24.8	+ 1.2	11.38	.....	s.	74.0
Sydney, C. B. I	29.88	29.94	+ .04	22.8	+ 3.3	3.63	— 1.18	nw.	14.0
Grindstone, G. St. L.	.....	.....	.....	.....	.....	.....	.....	.....	.....
Halifax, N. S	29.86	30.00	+ .04	23.0	+ 2.0	5.89	+ 0.20	nw.	24.6
Grand Manan, N. B.	29.96	29.98	— .01	25.2	.....	3.76	— 1.61	w.	11.6
Yarmouth, N. S.	29.90	29.98	— .04	25.5	0.0	6.76	+ 1.54	nw.	44.3
St. Andrews, N. B.	.....	.....	.....	19.0	+ 0.9	3.43	+ 0.13	nw.	22.0
Charlottet'n, P. E. I.	29.90	29.94	— .02	18.3	+ 2.3	2.56	— 0.85	w.	13.0
Chatham, N. B	29.94	29.96	— .06	11.6	+ 5.6	3.65	+ 0.37	w.	21.1
Father Point, Que.	29.93	29.96	— .06	10.6	+ 4.6	4.39	+ 1.69	w.	27.1
Quebec, Que	29.66	30.02	— .04	12.1	+ 5.1	3.05	— 0.62	ne.	15.2
Montreal, Que	29.82	30.05	— .03	13.8	+ 3.8	3.03	— 0.25	w.	26.1
Rockliffe, Ont	29.50	30.05	— .01	9.6	+ 6.1	3.20	+ 0.19	nw.	12.4
Kingston, Ont	29.72	30.06	— .02	18.1	+ 3.1	2.49	+ 0.77	ne.	....
Toronto, Ont	29.67	30.08	— .01	22.0	+ 3.0	1.92	— 0.59	sw.	11.2
White River, Ont	28.63	30.10	.00	1.2	+ 5.2	1.76	+ 0.43	n.	17.2
Port Stanley, Ont	29.44	30.12	+ .02	21.3	.....	2.83	+ 0.15	w.	19.6
Saugeen, Ont	29.30	30.06	.00	21.2	+ 2.7	5.74	+ 2.28	se.	47.2
Parry Sound, Ont.	29.30	30.04	— .04	16.5	+ 5.0	4.77	+ 1.62	se.	29.1
Port Arthur, Ont	29.28	30.04	— .06	5.8	+ 5.3	1.43	— 0.62	w.	8.6
Winnipeg, Man	29.24	30.16	— .02	— 3.0	+ 8.0	0.89	+ 0.23	w.	8.7
Minnedosa, Man	28.19	30.17	+ .01	— 2.4	+ 9.1	1.70	+ 1.07	nw.	15.4
Qu'Appelle, Assin.	27.74	30.20	+ .04	1.0	+ 9.0	0.46	+ 0.08	nw.	4.6
Medicine Hat, Assin	27.74	30.21	+ .03	9.7	+ 8.2	0.74	+ 0.41	s.	7.4
Swift Curr't, Assin.	27.45	30.22	+ .04	8.6	+10.6	0.57	— 0.04	w.	5.7
Calgary, Alberta	26.40	30.15	— .03	12.4	+ 8.9	0.53	— 0.04	w.	5.3
Prince Albert, Sask.	.....	.....	.....	— 0.8	.....	1.56	.....	sw.	15.6
Edmonton, Alberta	27.70	30.32	+ .09	6.0	+ 4.8	0.10	— 0.63	w.	1.0
Battleford, Sask	28.35	30.25	.....	— 1.4	.....	0.06	.....	nw.	0.6
Kamloops, B. C.	28.92	30.22	.....	26.4	.....	0.64	.....	e.	5.4
Hamilton, Bermuda	.....	.....	.....	.....	.....	.....	.....	.....	.....
Banff, Alberta	25.32	30.21	... .	11.6	.....	1.44	.....	sw.	13.6
Esquimalt, B. C.	30.03	30.06	... .	38.4	.....	5.98	....	n.	14.0
Ottawa, Ont	29.71	30.10	.....	12.2	... .	1.93	.....	w.	15.5

TABLE IV not received in time.

TABLE V.—*Mean temperature for each hour of seventy-fifth meridian time, January, 1897.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Bismarck, N Dak.....	4.2	3.8	2.7	2.4	2.5	2.5	2.5	2.5	2.1	2.4	3.4	5.0	6.4	8.0	9.5	9.9	9.9	9.5	8.2	6.9	5.8	5.1	4.5	4.4	5.2
Boston, Mass.	26.5	26.5	26.5	26.2	25.8	25.7	26.0	26.4	27.6	28.8	30.3	32.0	33.1	33.7	33.4	32.6	31.7	30.9	29.9	29.0	28.2	27.7	26.9	26.7	28.8
Buffalo N Y.....	23.7	23.3	23.0	23.2	23.1	22.8	23.2	23.7	23.8	24.9	26.3	27.2	27.1	27.4	27.6	27.5	26.9	26.1	25.4	25.5	24.7	24.3	24.1	23.8	25.0
Chicago, Ill.....	22.0	21.5	21.2	20.8	20.6	20.3	20.0	20.1	19.9	20.4	21.3	22.2	23.2	23.5	24.0	24.1	24.2	23.8	23.4	23.1	22.6	22.6	22.4	22.0	22.1
Cincinnati, Ohio.....	27.8	27.5	26.9	26.4	26.0	25.4	25.0	25.2	25.2	25.7	27.1	28.9	29.9	31.1	32.0	32.7	32.9	32.6	31.7	31.0	30.0	29.3	28.6	27.8	28.6
Cleveland, Ohio	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Detroit, Mich.....	21.9	21.7	21.5	21.3	21.2	20.9	20.7	21.0	20.6	21.8	23.0	24.1	24.8	25.8	26.2	25.9	25.5	24.8	24.2	23.9	23.1	22.6	22.2	21.6	22.9
Dodge City, Kans.....	23.9	23.6	23.3	23.1	23.0	22.6	22.4	22.5	22.4	23.4	25.5	27.8	30.2	32.4	33.8	35.3	36.1	35.9	32.8	29.2	27.9	26.6	25.6	24.5	27.2
Eastport, Me.....	19.8	19.5	19.1	18.8	18.8	18.9	18.8	18.7	19.3	20.1	21.1	22.1	23.2	23.6	23.9	24.1	23.5	23.1	22.7	22.6	22.2	21.6	21.2	20.8	21.1
Galveston, Tex.....	51.2	50.7	50.5	49.9	49.3	48.7	48.3	47.9	47.8	48.1	48.7	50.1	51.3	52.2	53.0	53.4	53.4	53.0	52.3	52.0	51.8	51.3	50.9	50.7	50.7
Havre, Mont.....	11.5	11.6	11.3	11.0	10.6	10.6	10.1	10.5	8.5	8.0	8.0	10.6	13.7	16.0	18.0	18.8	19.3	18.9	17.2	15.3	13.8	13.3	12.9	12.4	13.0
Kansas City, Mo.....	26.4	25.6	25.1	24.8	24.1	23.5	23.0	22.9	22.7	23.5	25.2	27.0	28.4	29.7	30.9	31.6	31.6	30.4	29.6	29.5	28.1	27.3	26.6	26.2	26.8
Key West, Fla.....	66.6	66.5	66.5	66.2	66.1	66.0	65.8	65.9	66.6	67.2	68.1	68.6	68.8	68.9	69.0	68.8	68.5	67.8	67.5	67.2	67.0	67.0	66.9	66.9	67.3
Memphis, Tenn.....	40.0	39.4	38.8	38.0	37.3	36.2	34.3	35.7	35.7	36.1	37.2	38.8	40.4	41.4	42.4	43.3	43.9	44.2	43.1	42.2	41.7	41.1	40.5	39.9	39.6
New Orleans, La.....	49.8	49.3	49.1	48.9	48.4	48.0	47.4	47.1	47.3	48.4	49.8	50.8	51.8	52.7	53.8	54.1	54.2	53.7	53.1	52.3	51.5	50.6	49.9	49.6	50.5
New York, N. Y.....	27.8	28.0	27.2	27.1	27.1	26.9	26.5	26.5	27.1	28.2	29.9	30.5	31.4	31.9	32.7	32.6	31.4	30.5	29.9	29.4	28.8	28.5	28.2	27.8	29.0
Philadelphia, Pa.....	30.2	29.7	29.7	29.1	28.3	27.8	27.4	27.8	28.3	29.6	30.9	32.0	33.1	33.5	33.6	33.4	33.1	32.4	31.9	31.9	31.1	30.5	29.9	29.4	30.6
Pittsburg, Pa*.....	20.4	19.6	19.4	18.8	18.2	18.0	18.3	18.4	18.7	19.8	21.6	22.6	23.8	24.9	26.1	26.5	26.2	25.7	25.2	24.5	23.8	22.6	21.5	19.9	21.9
Portland, Oreg.....	38.6	38.5	37.6	37.5	36.9	36.9	36.6	36.7	36.6	36.0	36.1	36.3	36.9	37.8	39.0	39.9	40.9	41.3	41.2	40.8	40.0	39.4	39.3	38.3	38.3
St. Louis, Mo.....	29.8	29.4	28.8	28.5	28.2	27.7	27.6	27.5	27.5	28.1	28.7	29.7	31.1	31.8	32.8	33.4	33.8	33.3	32.5	31.8	31.3	30.8	30.2	29.8	30.2
St. Paul, Minn.....	8.8	8.2	7.7	7.4	6.8	6.0	5.6	5.5	5.2	5.7	6.6	8.5	10.7	12.0	13.6	14.2	14.5	14.1	13.4	12.9	12.0	10.9	9.9	9.4	9.6
Salt Lake City, Utah..	26.3	26.4	25.7	25.5	25.5	25.6	25.2	25.3	24.8	24.7	25.6	27.2	29.7	31.9	32.6	34.0	34.7	34.6	33.7	31.7	30.3	29.3	28.1	27.1	28.6
San Diego, Cal.....	52.8	52.5	52.0	51.4	51.2	50.6	50.2	50.6	49.9	50.2	51.9	55.3	58.5	60.1	61.6	62.3	62.3	61.7	60.5	59.1	57.3	55.9	54.7	53.7	55.3
San Francisco, Cal....	47.9	47.4	47.0	46.8	46.6	46.5	45.9	45.7	45.5	45.5	45.2	45.9	46.7	48.2	49.1	50.2	51.1	51.8	52.0	51.1	50.1	49.6	49.0	48.5	48.1
Savannah, Ga.....	45.1	44.8	44.1	43.5	42.6	42.5	42.2	42.8	44.4	47.8	50.4	52.5	54.2	55.2	55.7	55.0	53.7	51.8	50.4	49.4	48.4	47.6	46.5	45.7	48.2
Washington, D. C....	29.4	28.3	27.4	26.8	26.5	26.0	25.6	25.9	27.0	28.7	31.3	33.2	34.5	35.9	36.7	36.7	36.1	34.7	33.1	31.9	31.0	30.5	29.8	29.5	30.7

*Record for last 17½ days only.

TABLE VI.—*Mean pressure for each hour of seventy-fifth meridian time, January, 1897.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Bismarck, N. Dak...	28.302	.301	.302	.301	.295	.285	.276	.269	.271	.283	.286	.286	.282	.270	.264	.268	.281	.297	.305	.310	.315	.319	.320	.320	.292
Boston, Mass.....	29.903	.903	.903	.893	.887	.892	.903	.915	.918	.915	.899	.874	.858	.861	.868	.882	.888	.901	.910	.912	.912	.908	.906	.904	.896
Buffalo, N. Y.....	29.207	.209	.215	.212	.207	.209	.218	.226	.233	.235	.231	.213	.199	.194	.195	.200	.204	.215	.223	.224	.221	.218	.214	.211	.214
Chicago, Ill.....	29.180	.180	.191	.189	.181	.178	.187	.200	.212	.223	.224	.210	.190	.177	.180	.185	.189	.192	.198	.202	.201	.200	.197	.191	.194
Cincinnati, Ohio ...	29.484	.483	.490	.489	.487	.485	.494	.501	.516	.523	.520	.502	.477	.468	.463	.466	.469	.474	.482	.486	.492	.492	.492	.490	.489
Cleveland, Ohio	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Detroit, Mich.....	29.275	.278	.285	.284	.276	.274	.277	.286	.295	.297	.297	.284	.266	.260	.264	.266	.272	.281	.290	.295	.291	.287	.283	.279	.281
Dodge City, Kans..	27.482	.483	.484	.492	.496	.493	.494	.495	.498	.505	.515	.514	.501	.480	.460	.452	.450	.453	.462	.475	.490	.495	.498	.499	.486
Eastport, Me.....	29.870	.876	.875	.872	.873	.885	.903	.919	.927	.925	.905	.887	.873	.871	.875	.876	.882	.884	.891	.891	.887	.879	.872	.869	.886
Galveston, Tex.....	30.181	.178	.178	.178	.177	.175	.182	.189	.200	.218	.228	.224	.197	.165	.144	.135	.132	.136	.150	.163	.172	.182	.190	.192	.178
Havre, Mont.....	27.415	.414	.411	.409	.419	.417	.413	.408	.417	.426	.437	.444	.445	.432	.415	.408	.410	.411	.411	.409	.412	.412	.413	.415	.418
Kansas City, Mo....	29.121	.120	.126	.131	.126	.123	.125	.129	.138	.149	.160	.166	.144	.127	.115	.114	.116	.120	.125	.130	.135	.140	.137	.136	.131
Key West, Fla.....	30.134	.126	.118	.115	.110	.114	.129	.148	.164	.176	.169	.150	.127	.107	.101	.102	.105	.115	.126	.137	.144	.149	.148	.141	.131
Memphis, Tenn.....	29.759	.755	.762	.766	.761	.758	.762	.774	.789	.805	.815	.808	.783	.756	.743	.742	.746	.750	.752	.760	.765	.768	.773	.769	.768
New Orleans, La....	30.147	.145	.142	.140	.138	.139	.149	.161	.178	.191	.194	.185	.159	.131	.118	.115	.116	.122	.128	.134	.142	.150	.153	.151	.147
New York, N. Y....	29.748	.747	.743	.735	.730	.732	.743	.758	.770	.776	.765	.750	.738	.735	.742	.748	.757	.764	.768	.768	.770	.767	.763	.757	.753
Philadelphia, Pa....	29.991	.997	.000	.996	.996	.999	.012	.026	.038	.043	.036	.015	.998	.994	.998	.000	.005	.011	.014	.015	.015	.013	.009	.001	.009
Pittsburg, Pa.....	29.224	.228	.231	.226	.225	.226	.231	.233	.241	.245	.239	.226	.213	.207	.207	.210	.215	.216	.220	.224	.222	.222	.223	.224	.224
Portland, Oreg.....	29.945	.945	.943	.944	.946	.949	.943	.937	.934	.935	.941	.952	.960	.965	.952	.935	.924	.922	.921	.920	.930	.923	.925	.928	.938
St. Louis, Mo.....	29.540	.541	.549	.554	.548	.548	.551	.556	.564	.574	.583	.579	.556	.540	.534	.536	.541	.543	.548	.552	.553	.554	.553	.552	.552
St. Paul, Minn.....	29.163	.170	.177	.187	.189	.183	.180	.178	.185	.197	.198	.199	.183	.162	.147	.147	.149	.152	.153	.162	.166	.168	.171	.173	.172
Salt Lake City, Utah	25.721	.722	.718	.721	.726	.725	.718	.716	.721	.728	.740	.750	.752	.740	.724	.712	.713	.717	.719	.719	.722	.724	.724	.725	.725
San Diego, Cal.....	30.002	.001	.994	.993	.992	.992	.987	.984	.985	.991	.005	.019	.028	.030	.988	.967	.957	.957	.961	.964	.974	.984	.992	.000	.989
San Francisco Cal..	29.964	.963	.962	.960	.964	.964	.955	.950	.955	.964	.974	.985	.993	.987	.960	.940	.933	.932	.930	.938	.932	.938	.940	.945	.955
Savannah, Ga.....	30.098	.097	.103	.116	.099	.103	.116	.130	.143	.153	.148	.126	.094	.072	.060	.055	.057	.064	.074	.087	.090	.091	.094	.095	.098
Washington, D. C...	30.038	.044	.048	.048	.047	.054	.069	.080	.097	.102	.094	.075	.050	.041	.036	.037	.039	.047	.056	.061	.060	.056	.051	.044	.057

TABLE VII.—*Average wind movement for each hour of seventy-fifth meridian time, January, 1897.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Abilene, Tex.	7.3	7.3	7.0	6.6	7.4	7.3	7.8	7.5	7.5	7.6	8.0	8.8	9.5	9.5	9.6	10.3	10.4	10.1	9.4	7.7	7.3	6.9	6.9	6.7	8.1
Albany, N. Y.	6.7	7.3	7.5	7.5	7.7	7.6	7.5	7.9	8.4	9.8	10.5	10.7	11.4	10.9	11.2	11.4	10.5	9.3	9.1	8.9	8.2	7.5	7.2	6.6	8.8
Alpena, Mich.	9.4	9.5	10.0	9.9	10.0	9.7	9.2	10.4	10.0	9.8	10.1	10.7	10.9	10.6	10.6	10.6	8.9	8.6	9.1	9.3	9.5	9.6	9.8	10.0	9.8
Amarillo, Tex.	15.3	14.8	15.2	15.0	15.0	14.7	13.5	13.9	13.2	14.1	14.5	15.6	16.0	15.5	15.1	15.6	15.1	14.3	13.3	12.9	12.7	13.3	13.8	14.0	14.4
Atlanta, Ga.	11.9	11.6	11.3	11.3	11.8	11.6	11.8	11.5	11.4	11.9	12.5	12.5	12.6	13.0	13.2	13.2	12.9	12.0	10.6	11.5	11.4	11.7	12.6	12.4	12.0
Atlantic City, N. J.	12.8	12.6	12.8	12.9	12.4	12.2	11.7	12.4	13.3	13.8	14.5	14.3	14.4	15.0	14.5	14.4	13.7	11.3	11.4	11.8	11.7	11.6	12.4	12.1	12.9
Augusta, Ga.	6.3	5.4	5.9	5.7	6.1	5.8	5.8	6.0	6.2	7.0	7.7	8.0	8.6	8.7	9.1	9.4	9.4	8.3	7.7	7.6	7.0	6.9	6.9	6.6	7.2
Baker City, Oreg.	4.5	5.0	4.6	4.0	4.1	5.3	5.2	4.9	5.2	5.0	4.7	5.5	5.2	5.5	5.6	5.6	5.5	6.0	5.4	4.5	4.5	4.4	4.1	4.3	4.9
Baltimore, Md.	5.1	5.2	4.9	5.8	5.2	5.6	5.8	5.9	6.1	6.6	7.1	7.6	7.5	7.6	7.7	7.0	7.0	6.5	6.0	5.6	5.5	5.0	5.2	5.4	6.1
Bismarck, N. Dak.	10.9	11.5	10.2	9.5	9.6	10.4	9.4	9.7	9.5	9.6	9.9	11.3	12.4	12.2	13.8	13.5	12.5	11.8	10.5	9.9	9.4	9.5	9.4	10.4	10.7
Block Island, R. I.	19.6	19.0	18.8	18.8	18.6	18.8	19.3	19.3	19.4	18.8	18.2	17.9	18.0	18.1	18.3	17.9	17.2	17.5	18.1	18.1	18.4	19.0	19.5	19.8	18.6
Boston, Mass.	12.4	13.0	13.0	12.7	13.1	13.0	12.9	12.4	13.3	13.9	13.8	14.0	13.7	14.0	14.6	13.7	13.7	12.3	12.6	12.3	13.3	13.2	12.9	12.7	13.2
Buffalo, N. Y.	18.8	18.7	18.1	18.1	18.6	18.4	18.3	18.6	19.4	18.5	18.8	19.8	20.5	19.8	19.1	19.5	20.4	21.1	21.4	19.8	20.0	19.2	19.2	18.0	19.2
Cairo, Ill.	9.8	10.4	10.0	9.5	9.9	10.3	10.3	10.0	10.3	10.9	11.4	10.8	11.1	11.5	11.2	10.9	10.7	10.5	9.5	10.1	10.6	10.3	10.5	10.1	10.4
Cape Henry, Va.	14.0	14.2	14.0	13.9	14.3	13.2	13.2	14.2	13.9	14.1	14.4	13.5	13.5	13.0	13.1	12.1	11.5	11.6	11.8	12.9	13.0	13.5	14.8	14.5	13.4
Charleston, S. C.	8.3	8.2	8.1	8.3	8.1	8.3	8.1	7.8	8.1	8.5	8.4	8.5	9.6	9.6	10.2	9.9	9.2	8.1	7.7	7.9	8.0	8.8	9.1	9.0	8.6
Charlotte, N. C.	6.0	5.8	8.2	5.7	6.0	5.9	5.7	5.8	6.0	6.9	7.0	7.4	7.6	7.7	8.0	7.6	7.0	6.1	6.2	6.9	7.0	7.0	6.9	6.6	6.6
Chattanooga, Tenn.	8.0	7.8	7.8	7.1	7.6	7.6	7.6	8.2	8.2	8.9	9.7	9.6	10.1	10.7	11.0	11.2	10.6	10.5	9.0	9.1	8.2	7.1	7.8	7.5	8.8
Cheyenne, Wyo.	9.7	9.7	9.6	10.5	11.1	10.6	10.8	10.2	10.9	11.0	11.0	12.1	14.1	15.6	16.4	15.9	15.8	14.6	12.3	10.9	10.0	9.4	9.1	9.8	11.7
Chicago, Ill.	18.7	19.4	19.4	18.3	18.5	18.5	17.9	18.1	18.6	18.2	17.5	17.7	18.3	18.3	18.7	19.0	19.9	19.5	19.8	19.3	19.6	18.8	18.5	18.1	18.7
Cincinnati, Ohio.	8.8	8.7	9.0	8.8	8.2	8.6	8.3	8.9	10.0	10.5	10.9	11.3	11.4	11.4	11.5	10.6	10.3	9.5	9.7	9.6	9.3	9.4	9.1	9.7	
Cleveland, Ohio	16.9	17.2	17.3	16.9	16.1	15.6	15.8	16.4	16.5	17.2	17.7	18.1	17.7	17.5	17.5	17.3	17.3	16.8	16.8	17.3	18.7	18.8	17.8	17.0	17.2
Columbia, Mo.	9.9	9.8	9.7	9.7	9.9	9.3	9.2	9.5	9.8	10.9	11.4	11.2	11.5	12.5	12.5	12.6	12.5	10.9	10.3	10.0	10.5	10.0	9.8	10.1	10.6
Columbus, Ohio	8.6	8.2	8.1	7.9	8.1	7.9	8.2	7.5	8.2	9.1	9.8	10.1	10.7	10.4	10.4	10.8	10.2	9.3	9.2	9.4	9.1	9.0	8.9	8.8	9.1
Concordia, Kans.	7.1	7.1	6.8	7.2	7.2	7.3	7.4	7.8	7.6	7.8	9.7	10.2	10.2	9.7	10.0	10.1	9.5	8.7	6.9	6.6	6.9	6.5	6.8	7.1	8.0
Corpus Christi, Tex.	9.8	10.0	10.2	10.5	10.7	10.5	10.6	10.3	11.6	11.8	12.0	12.2	12.8	12.4	12.2	13.2	12.5	11.8	11.5	10.7	9.5	9.4	9.9	10.0	
Davenport, Iowa.	10.0	9.5	9.2	8.4	8.3	8.5	8.3	8.6	8.2	9.3	10.1	10.7	10.5	10.9	11.4	11.5	11.1	10.7	10.0	9.9	10.1	9.9	9.5	9.4	11.1
Denver, Colo.	5.9	7.1	7.8	7.5	6.9	7.1	7.6	7.7	7.4	7.1	6.9	7.0	6.5	6.2	6.0	7.0	7.2	7.2	7.8	8.5	7.9	6.7	6.5	6.5	9.7
Des Moines, Iowa.	8.7	7.9	7.5	7.3	7.1	7.5	7.5	8.0	8.3	8.9	9.7	10.2	11.0	10.9	10.8	10.5	10.1	9.2	8.6	7.9	8.4	9.0	8.6	8.4	7.1
Detroit, Mich.	10.6	10.2	10.3	9.7	9.7	10.0	10.1	10.6	10.3	10.7	12.1	12.1	12.8	13.3	12.9	12.6	12.2	11.9	11.6	11.1	10.8	10.7	10.3	10.4	8.8
Dodge City, Kans.	9.2	10.2	10.0	10.7	11.3	11.8	11.1	11.1	11.8	12.6	13.4	13.6	13.5	13.5	12.8	11.8	10.6	9.3	8.2	8.0	8.4	9.1	9.0	8.7	10.8
Dubuque, Iowa.	6.6	6.2	6.0	6.2	6.0	5.5	5.5	5.5	5.5	5.6	6.0	6.5	7.1	7.6	7.6	8.0	7.5	6.7	6.0	6.5	6.0	6.4	6.4	6.3	6.4
Duluth, Minn.	11.6	11.6	11.8	10.7	10.7	10.5	10.2	9.8	9.6	9.0	8.7	8.5	8.9	9.6	9.5	8.6	8.5	8.7	8.2	9.5	10.8	12.0	13.1	12.3	10.1
Eastport, Me.	13.5	14.4	14.3	14.1	14.3	15.0	14.4	14.9	15.3	15.8	15.8	15.9	15.1	14.7	14.7	14.3	13.6	14.7	15.0	14.8	14.7	13.9	13.4	13.4	14.6
El Paso, Tex.	9.6	10.0	9.4	8.7	9.3	9.0	8.6	8.0	7.8	8.0	7.4	7.9	9.6	10.4	11.0	12.0	12.4	12.8	11.4	9.3	8.4	9.8	10.1	9.9	9.6
Erie, Pa.	15.5	15.3	15.5	15.1	15.4	15.0	14.9	14.8	15.1	15.6	15.4	15.3	14.9	14.5	14.3	14.1	13.9	14.2	13.8	14.5	15.5	16.0	16.1	15.5	15.0
Eureka, Cal.	4.3	3.5	3.5	3.8	3.5	3.1	3.0	2.9	3.6	3.4	3.8	3.4	3.8	4.5	5.5	6.5	7.3	7.6	7.2	6.7	5.6	5.5	4.9	4.9	4.7
Fort Canby, Wash.	16.1	16.6	16.2	16.5	16.5	17.2	17.1	17.4	17.7	16.9	15.8	15.8	14.5	14.8	16.1	16.8	16.5	16.7	16.9	16.5	16.7	17.4	17.2	17.9	16.6
Fort Smith, Ark.	6.9	7.0	6.6	6.5	6.4	6.5	6.8	6.6	7.2	7.9	9.2	9.2	9.4	9.1	8.9	9.2	8.9	8.6	8.7	7.9	7.2	6.4	7.0	6.9	7.7
Fresno, Cal.	4.0	4.0	4.2	3.8	3.8	4.0	3.5	3.7	3.9	3.5	3.5	3.7	3.9	4.1	4.4	4.1	4.3	4.1	4.3	3.9	3.6	3.5	3.9	4.1	3.9
Galveston, Tex.	13.8	13.5	13.5	13.2	13.6	12.9	13.4	13.3	12.9	12.5	12.8	12.8	13.1	12.5	12.5	12.3	12.1	12.3	12.5	11.7	11.7	11.5	12.1	13.3	12.7
Grand Haven, Mich.	11.5	11.5	12.0	12.0	11.8	12.3	12.4	11.9	12.1	12.4	12.8	13.6	14.1	13.9	13.5	13.7	13.3	12.9	12.8	12.5	12.3	12.5	12.4	11.5	12.6
Greenbay, Wis.	8.9	9.2	9.2	8.8	9.0	8.6	8.9	8.6	8.5	8.8	10.1	10.4	10.6	10.5	10.5	10.4	9.8	8.8	8.7	8.6	9.0	9.0	9.0	8.8	9.3
Hannibal, Mo.	11.5	11.1	10.3	9.5	9.1	9.0	9.7	9.4	9.2	10.2	11.1	11.0	11.6	12.3	12.3	12.3	12.5	11.5	11.2	10.9	10.8	10.3	11.2	10.8	10.8
Harrisburg, Pa.	9.8	10.5	10.0	9.5	10.3	10.6	10.3	10.0	10.0	10.9	10.9	11.3	11.6	12.1	12.0	11.2	10.7	10.2	9.6	9.8	9.5	10.1	9.8	10.1	10.4
Hatteras, N. C.	16.6	16.7	16.4	16.5	16.3	16.3	16.5	15.7	15.8	15.8	15.7	15.0	15.0	15.1	14.4	13.3	13.5	13.6	14.5	14.7	14.2	14.8	15.8	16.6	
Havre, Mont.	9.2	8.7	9.3	9.5	9.3	9.5	8.9	9.5	9.2	8.1	7.5	8.0	9.7	9.8	10.4	10.0	10.3	9.3	8.4	7.7	7.2	8.3	9.3	10.0	15.4
Helena, Mont.	5.0	4.8	5.4	4.6	5.1	5.2	4.7	4.4	4.8	4.5	4.8	4.3	4.7	4.9	4.6	4.7	4.1	4.2	5.5	5.5	5.7	4.7	5.1	4.9	9.0
Huron, S. Dak.	16.2	15.8	16.5	16.3	16.1	16.0	15.3	14.9	14.8	15.4	15.5	16.5	16.6	16.5	16.3	16.6	15.9	15.5	15.1	15.2	14.9	15.1	15.6	15.8	4.9
Idaho Falls, Idaho.	7.1	7.1	6.5	6.7	6.7	6.5	7.1	6.3	6.6	6.5	6.7	7.2	6.8	6.5	6.8	6.7	6.5	6.5	6.5	6.9	6.4	5.9	6.6	6.7	15.8
Indianapolis, Ind.	12.2	11.9	11.6	11.1	11.6	11.6	12.0	11.9	11.5	12.4	13.0	13.1	13.8	14.0	14.3	13.9	13.2	11.8	11.3	11.3	11.7	11.7	12.1	13.3	6.7
Jacksonville, Fla.	6.5	6.4	5.6	5.6	5.6	6.0	5.7	6.2	6.3	7.2	8.4	9.1	9.0	9.7	10.1	10.3	9.6	9.0	7.4	6.3	5.9	6.2	5.9	5.9	12.3
Jupiter, Fla.	9.3	10.5	10.4	10.8	10.5	10.3	10.4	10.8	11.4	11.8	12.5	12.6	13.2	12.7	12.0	11.6	11.0	10.3	9.7	9.4	9.9	9.5	9.2	9.3	7.2
Kansas City, Mo.	8.8	8.3	8.1	8.2	8.3	8.8	8.7	8.9	8.9	9.5	10.0	10.1	11.5	11.3	11.2	11.0	10.1	9.1	9.6	9.2	9.5	8.8	8.7	8.5	10.7
Keokuk, Iowa.	9.2	8.8	8.8	8.4	8.2	8.7	7.4	7.5	7.9	8.8	9.7	10.1	10.6	10.8	11.1	10.9	10.2	10.0	9.9	9.2	9.4	9.3	8.8	9.3	9.5
Key West, Fla.	10.9	11.0	10.9	10.9	11.2	10.5	10.3	10.7	10.5	10.6	11.1	10.9	11.0	11.2	11.5	11.2	11.2	10.7	10.5	11.1	11.6	11.6	11.4	11.5	9.3
Kittyhawk, N. C.	14.9	15.0	15.2	15.2	15.2	15.4	15.0	14.8	15.6	16.2	16.1	15.5	15.8	15.2	15.1	14.8	14.1	13.3	12.9	13.4	15.0	16.2	16.7	16.1	11.0
Knoxville, Tenn.	4.9	4.8	5.1	4.8	4.7	4.8	4.4	5.0	5.5	6.2	7.3	7.5	7.7	8.1	8.2	8.7	7.7	7.0	5.9	5.8	5.9	5.6	5.6	5.8	15.1
La Crosse, Wis.	7.5	7.1	7.3	7.3	7.3	6.5	6.5	6.9	6.5	6.4	7.0	7.7	8.0	8.4	8.2	8.7	8.8	8.0	7.9	8.2	8.3	8.3	7.5	7.6	6.1
Lander, Wyo.	2.6	2.4	2.5	2.2	2.4	2.2	2.4	2.3	2.0	2.0	2.2	2.7	2.8	3.1	3.5	4.5	4.3	3.7	3.6	3.4	2.5	2.4	2.3	2.8	2.8
Lexington, Ky.	14.5	13.7	13.5	13.0	13.0	13.1	13.5	13.5	14.0	14.6	14.4	14.9	15.4	15.6	15.5	15.2	14.5	12.8	12.3	13.2	13.5	13.8	13.8	14.1	14.0
Little Rock, Ark.	7.3	6.8	6.7	7.0	6.6	7.0	6.9	6.8	7.0	7.5	9.1	9.2	9.8	10.0	10.3	10.3	10.1	9.9	9.2	8.2	7.4	7.0	7.7	7.7	8.1
Los Angeles, Cal.	3.3	4.2	4.4	4.0	4.3	4.3	4.6	4.6	4.5	4.9	4.4	4.3	5.3	5.6	5.4	5.5	5.6	6.2	6.2	5.7	3.8	3.0	2.8	3.6	4.6
Louisville, Ky.	9.6	9.5	9.2	8.5	9.3	9.0	9.4	9.1	9.5	9.7	10.3	11.1	11.6	12.8	12.5	12.7	11.9	10.7	10.5	10.4	10.3	9.5	8.8	8.4	10.2
Lynchburg, Va.	4.5	4.5	4.4	4.4	4.3	5.0	5.1	5.1	4.6	5.4	5.9	6.4	6.5	6.9	7.3	6.9	6.6	6.0	4.9	4.9	4.6	4.1	4.2	4.9	5.3
Marquette, Mich.	11.3	11.6	10.5	10.0	10.1	9.8	9.4	10.4	10.1	10.3	10.3	11.8	13.0	13.4	12.7	11.6	11.5	10.5	11.0	12.3	12.5	12.7	12.3	11.6	11.3
Memphis, Tenn.	12.2	12.4	12.1	12.4	12.4	12.5	12.1	11.8	12.1	12.5	12.4	12.1	12.1	12.4	12.0	12.5	12.4	12.2	11.6	11.7	11.5	11.2	12.5	12.1	12.1
Miles City, Mont.	5.6	5.8	5.5	5.5	5.3	4.9	4.4	4.3	4.5	5.1	5.2	6.5	7.2	6.8	7.5	7.1	6.8	6.1	5.4	5.2	5.6	5.3	5.3	5.3	5.7
Milwaukee, Wis.	12.0	11.7	11.4	11.1	11.2	11.0	10.6	11.2	11.3	11.8	12.1	12.1	12.4	12.0	12.5	12.4	12.2	11.6	11.7	11.5	12.0	11.4	11.8	11.9	11.9
Mobile, Ala.	8.4	8.5	8.5	9.3	9.0	9.2	9.2	8.7	9.1	9.7	10.3	10.5	12.9	13.3	13.1	13.2	12.3	11.6	11.4	12.0	11.4	11.8	11.9	11.9	8.8
Montgomery, Ala.	6.2	6.2	6.4	6.8	7.0	7.0	6.9	7.0	7.6	8.0	8.7	8.6	9.1	9.6	9.9	9.9	10.1	9.1	7.9	7.1	6.8	6.6	6.3	6.6	6.4
Moorhead, Minn.	12.4	12.1	12.0	11.7	12.2	12.1	11.6	11.4	11.8	11.9	12.6	13.6	14.0	14.2	13.6	13.6	13.0	13.0	11.7	11.0	11.3	11.7	11.9	11.5	12.0
Nantucket, Mass.	14.5	14.2	14.0	14.4	14.2	13.8	13.8	14.4	13.8	14.2	13.8	13.7	14.0	13.6	13.4	13.0	12.1	11.7	12.9	13.9	13.5	13.4	14.3	14.2	12.3
Nashville, Tenn.	8.1	7.7	7.2	7.4	7.3	7.5	7.4	7.0	7.7	8.8	10.1	10.5	10.9	11.5	11.1	11.2	10.0	9.3	8.1	8.2	8.0	7.9	8.0	7.5	13.7
New Haven, Conn.	10.1	10.0	10.0	10.5	9.8	9.6	9.6	9.8	10.4	11.5	12.6	12.7	13.7	13.5	13.2	12.7	11.6	10.4	9.5	9.5	9.2	9.8	9.8	10.8	8.7
New Orleans, La.	9.9	10.0	10.0	10.6	10.9	10.8	11.1	10.7	11.3	11.7	12.2	12.1	12.2	12.2	11.9	11.9	11.5	9.8	7.8	7.9	8.4	9.0	9.4	9.4	10.8
New York, N. Y.	16.0	16.1	15.4	15.4	14.9	14.8	14.8	15.3	14.6	15.2	16.1	15.3	15.5	15.6	15.1	15.5	15.5	16.2	15.7	16.2	16.0	16.1	15.6	15.5	
Norfolk, Va.	8.4	7.6	7.5	7.5	7.4	7.2	7.3	7.6	8.2	9.1	10.3	9.8	10.1	9.9	9.0	9.1	7.7	7.4	7.7	8.2	8.3	8.3	8.4	8.4	8.4
Northfield, Vt.	7.5	8.1	7.2	7.1	6.3	5.7	7.0	7.5	7.0	8.3	9.3	9.8	10.3	9.7	10.4	10.6	9.9	9.7	9.6	9.3	8.1	7.4	7.5	8.4	10.5
North Platte, Nebr.	8.9	9.6	10.1	9.7	9.5	9.1	9.3	9.3	9.1	8.9	10.3	11.0	11.4	12.9	13.4	13.4	12.7	10.9	10.6	9.5	9.1	9.1	8.8	10.2	10.2
Oklahoma, Okla.	6.5	6.8	6.9	6.8	7.0	7.0	6.9	7.7	8.1	8.7	10.2	10.5	11.0	11.1	10.9	10.8	10.4	9.5	7.7	6.4	6.6	6.9	6.7	8.2	
Omaha, Nebr.	8.0	8.2	8.1	8.0	8.1	8.2	8.6	8.6	9.1	9.1	9.9	9.5	9.3	9.9	9.9	10.0	9.9	8.9	8.2	8.2	7.8	8.0	8.2	8.7	
Oswego, N. Y.	14.2	14.9	14.6	14.1	13.8	13.4	13.2	13.3	13.6	13.5	14.0	13.8	14.1	14.7	15.2	15.5	15.2	14.8	13.9	15.2	15.7	16.2	16.8	15.2	14.5
Palestine, Tex.	6.6	7.0	7.1	6.6	6.4	6.6	6.2	6.6	6.2	7.2	8.0	8.1	8.5	8.8	8.7	8.3	8.2	8.3	7.3	7.1	6.9	6.8	6.0	6.1	7.3
Parkersburg, W. Va.	6.3	6.5	5.5	5.6	5.8	5.3	5.4	5.5	5.7	6.6	7.7	7.8	8.6	8.2	8.3	8.0	7.1	6.4	6.7	6.7	6.9	6.9	7.0	6.6	6.7

TABLE VII.—*Average wind movement, etc.*—Continued.

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Pensacola, Fla.	9.8	10.7	10.9	11.5	11.9	12.1	11.2	11.2	11.6	12.6	12.8	12.4	11.5	12.1	11.5	12.1	12.8	11.5	10.5	9.9	9.9	10.0	10.2	10.3	11.3
Philadelphia, Pa.	10.3	10.1	10.2	10.6	10.6	10.5	10.7	11.0	11.4	11.9	11.9	12.2	13.0	13.2	13.1	12.7	11.8	11.0	11.0	11.4	10.7	11.1	11.1	10.2	11.3
Phœnix, Ariz.	2.6	2.8	3.0	3.4	3.3	3.5	3.4	3.5	3.1	3.5	3.4	3.6	4.0	4.3	4.6	4.5	4.8	4.8	3.9	3.3	3.3	3.0	2.9	3.1	3.6
Pierre, S. Dak.	8.6	8.5	9.2	8.9	8.9	8.7	8.8	8.0	8.3	8.2	9.1	9.3	10.4	10.7	11.4	11.4	11.6	11.1	10.9	9.7	9.8	9.7	9.2	8.7	9.5
Pittsburg, Pa.	7.7	7.4	7.0	7.2	7.3	7.1	7.1	7.3	7.9	7.8	7.8	8.0	8.4	9.1	8.5	8.5	8.1	7.5	7.5	7.6	7.3	7.5	7.9	7.4	7.7
Port Angeles, Wash.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Port Huron, Mich.	10.7	11.5	10.8	10.8	11.3	11.2	12.0	12.1	12.3	12.8	13.1	13.4	14.0	14.6	14.1	13.4	12.5	11.9	11.6	12.6	12.3	11.7	11.0	10.7	12.2
Portland, Me.	7.0	7.4	7.6	8.0	8.4	8.8	9.0	8.0	8.1	8.9	9.5	9.6	9.5	9.6	10.0	9.7	9.4	8.2	8.3	7.8	7.6	7.6	8.0	7.5	8.5
Portland, Oreg.	6.5	7.2	6.7	6.7	7.0	7.5	7.3	7.0	6.7	6.8	7.2	7.3	8.2	8.0	9.1	9.1	8.9	9.3	9.6	8.8	8.6	8.3	7.7	7.2	7.8
Pueblo, Colo.	6.1	5.6	5.2	5.2	5.0	4.5	4.7	4.4	4.5	4.9	5.7	5.9	6.6	7.9	8.7	9.7	9.9	8.4	7.2	5.0	4.1	4.9	5.5	5.0	6.0
Raleigh, N. C.	6.2	6.2	5.5	5.7	5.9	6.0	5.6	5.7	6.7	7.3	8.1	8.2	8.1	8.0	7.9	7.7	7.1	5.8	5.7	6.0	5.9	6.7	6.7	6.4	6.6
Rapid City, S. Dak.	7.0	7.0	7.3	7.7	7.6	7.5	8.0	7.8	7.9	8.1	8.0	8.1	8.5	9.8	10.6	10.8	11.0	10.7	8.7	7.9	7.7	7.8	7.4	7.5	8.4
Redbluff, Cal.	4.4	4.4	4.5	4.3	4.2	4.5	4.4	4.3	4.2	4.4	4.4	4.2	4.1	4.4	4.6	5.0	4.8	5.0	4.8	4.7	4.5	4.3	4.3	4.9	4.5
Rochester, N. Y.	10.4	10.2	10.1	9.7	10.3	9.4	9.5	9.6	10.2	10.6	11.1	11.6	12.1	11.5	11.3	11.0	10.5	10.6	10.8	10.8	11.0	10.5	10.1	10.0	10.5
Roseburg, Oreg.	1.7	1.9	2.4	2.1	2.2	2.1	2.0	1.8	1.9	1.9	1.8	2.1	2.1	2.5	2.8	3.1	2.9	3.7	3.4	3.0	2.5	2.2	1.9	2.0	2.3
Sacramento, Cal.	7.7	7.0	7.2	7.0	6.6	6.6	6.4	6.5	5.7	5.5	5.4	5.6	6.4	6.5	7.0	7.0	7.5	7.4	7.1	6.9	7.1	8.0	7.6	8.0	6.8
St. Louis, Mo.	12.7	11.9	12.8	12.6	12.1	11.4	11.4	12.1	12.3	12.4	13.2	13.5	13.2	13.3	13.3	13.0	13.2	12.1	12.2	12.2	12.3	12.7	12.6	12.1	12.5
St. Paul, Minn.	8.2	7.8	7.4	7.6	7.2	7.4	7.2	7.1	7.1	7.1	7.9	8.7	9.0	9.9	10.3	10.2	10.0	9.6	9.0	8.8	8.5	7.7	7.3	7.6	8.3
Salt Lake City, Utah.	3.4	3.0	3.3	3.2	3.4	3.3	3.0	3.3	3.4	3.8	4.1	3.6	4.0	4.6	4.8	4.5	4.7	4.8	4.0	2.6	2.8	2.6	2.9	2.9	3.6
San Antonio, Tex.	8.0	7.8	7.7	7.4	7.7	7.7	8.5	8.2	7.8	7.5	8.7	9.7	10.7	10.2	10.7	10.0	10.2	8.9	8.7	7.1	7.8	7.6	8.1	7.9	8.5
San Diego, Cal.	4.6	4.8	4.5	4.3	4.5	4.7	4.7	3.9	4.5	4.1	3.8	3.5	4.1	4.5	5.6	6.6	7.5	8.2	7.4	5.9	4.3	3.5	3.8	3.8	4.9
Sandusky, Ohio	9.3	9.1	9.1	8.9	9.1	8.9	9.0	8.7	9.2	9.9	11.0	10.7	11.0	11.1	10.7	10.9	9.9	9.6	10.0	9.3	9.1	9.1	9.0	9.5	9.7
San Francisco, Cal.	6.4	6.7	5.8	5.7	5.4	5.7	5.5	5.8	5.4	5.6	6.2	6.7	7.4	7.9	7.9	8.1	7.7	7.2	7.8	7.8	7.9	7.9	7.2	6.7	6.8
San Luis Obispo, Cal.	3.1	3.1	3.2	3.6	3.7	3.5	3.5	3.7	3.8	3.4	3.5	2.9	3.8	3.7	4.8	5.8	6.3	6.6	6.4	5.4	4.5	4.4	3.7	4.0	4.2
Santa Fe, N. Mex.	4.7	4.9	4.6	4.6	4.0	4.7	5.2	5.4	5.4	6.4	6.6	6.9	8.1	9.0	8.7	8.4	8.3	7.6	6.8	5.1	4.5	4.2	4.9	5.2	6.0
Sault Ste Marie, Mich.	10.2	9.9	9.3	9.0	9.5	9.3	9.6	8.8	8.5	7.9	7.7	7.2	8.0	8.5	8.7	9.0	9.6	9.2	9.5	9.4	9.8	9.5	9.3	9.6	9.0
Savannah, Ga.	8.5	8.6	8.3	8.5	8.4	8.0	8.3	8.5	8.6	8.7	9.5	9.7	10.6	10.6	10.3	10.2	10.4	9.3	8.5	8.5	8.8	8.7	8.8	8.9	9.0
Seattle, Wash.	4.8	5.0	4.5	4.9	4.6	4.4	4.2	3.8	4.0	4.4	4.0	4.1	4.6	4.6	4.8	5.2	5.1	5.3	4.9	5.1	5.0	5.0	4.6	5.0	4.7
Shreveport, La.	7.8	7.6	7.1	7.1	7.4	7.1	7.1	7.3	7.5	7.6	9.2	9.7	9.6	9.5	9.8	10.5	10.2	10.1	8.4	8.2	8.5	8.0	8.2	7.9	8.4
Sioux City, Iowa.	11.8	12.2	12.0	11.3	12.1	12.6	12.1	12.1	13.1	13.1	13.9	13.9	14.1	14.8	15.7	15.5	14.6	13.9	12.2	12.1	12.4	12.8	12.3	12.1	13.0
Spokane, Wash.	4.1	4.3	4.8	4.6	4.5	3.9	3.8	4.2	4.3	4.0	4.0	4.1	4.7	4.7	4.3	4.3	4.3	4.3	4.4	4.9	5.0	4.5	4.8	4.5	4.4
Springfield, Ill.	11.0	10.5	11.3	11.4	11.0	10.6	10.9	10.1	10.4	11.0	12.1	12.0	11.9	11.5	11.9	11.6	11.4	11.0	10.7	10.5	11.3	11.4	11.6	10.8	11.2
Springfield, Mo.	12.1	11.2	10.8	10.4	10.7	10.5	11.0	11.2	11.4	12.1	12.1	12.8	13.2	14.0	13.8	13.9	13.2	12.5	12.0	11.3	11.7	11.0	10.7	11.0	11.9
Tampa, Fla.	5.2	5.1	5.5	6.1	5.7	5.0	5.4	5.7	6.1	7.2	7.9	8.0	8.5	8.1	8.5	8.7	8.5	6.8	6.5	6.1	6.1	6.0	6.3	5.5	6.6
Tatoosh Island, Wash.	17.3	19.4	19.0	18.1	18.8	19.2	18.3	19.7	18.4	18.8	18.5	18.6	17.5	18.8	18.4	18.4	18.2	18.1	18.4	19.5	18.4	19.4	19.4	19.0	18.6
Toledo, Ohio.	10.8	10.0	10.0	10.5	10.5	10.3	10.3	10.9	10.7	11.8	13.3	13.6	13.6	13.2	12.6	12.1	12.9	12.3	12.2	12.0	11.3	10.8	10.7	10.5	11.5
Vicksburg, Miss.	9.2	8.7	8.5	7.9	7.8	7.2	7.0	7.4	7.5	8.2	8.9	8.7	8.5	8.7	8.9	8.8	8.5	8.5	7.9	7.6	8.2	8.3	8.5	8.5	8.2
Vineyard Haven, Mass	10.5	10.6	10.4	11.0	10.6	10.4	10.4	10.5	10.9	11.0	11.3	11.4	10.9	10.6	10.5	10.8	9.8	9.5	9.8	10.1	10.8	11.4	10.8	10.7	10.6
Walla Walla, Wash.	3.4	3.5	3.1	3.1	2.9	3.4	3.1	2.7	2.7	3.4	3.6	3.2	3.6	3.8	3.7	4.0	3.6	3.2	3.2	2.8	3.2	3.0	3.1	3.5	3.3
Washington, D. C.	7.3	7.3	7.5	7.6	7.0	7.1	6.9	7.2	7.5	8.9	9.8	9.7	10.8	11.2	11.8	11.5	10.0	8.7	8.7	8.5	7.7	7.3	7.0	6.7	8.5
Wichita, Kans.	8.4	8.1	7.5	7.8	7.8	8.1	8.5	8.5	9.7	9.5	10.9	11.9	13.2	13.3	12.7	12.4	12.1	10.6	9.1	8.3	8.3	8.8	8.5	8.2	9.7
Williston, N. Dak.	7.7	7.8	8.4	8.6	8.7	8.4	8.7	8.6	7.7	7.4	8.6	9.3	9.8	10.4	10.5	10.2	9.6	9.3	8.4	8.3	7.7	8.0	7.7	7.5	8.6
Wilmington, N. C.	8.5	8.4	8.3	8.7	8.8	8.7	8.2	8.5	9.0	9.7	9.9	9.8	9.9	9.7	9.8	9.6	9.3	7.8	7.8	7.6	7.3	7.5	7.6	7.5	8.7
Winnemucca, Nev.	6.7	7.1	7.7	7.4	7.7	8.5	8.5	9.0	8.6	8.8	8.9	8.5	8.6	9.0	8.6	7.2	6.6	6.9	6.8	6.5	6.7	8.0	7.6	6.7	7.8
Woods Hole, Mass.	18.1	18.1	17.5	17.6	17.8	16.8	16.7	18.0	17.2	17.1	17.1	16.5	15.8	15.5	16.3	16.4	16.4	15.9	16.3	17.4	17.7	18.2	18.7	17.8	17.1
Yuma, Ariz.	4.6	4.1	4.4	4.7	4.9	4.7	4.6	5.3	5.1	5.6	5.7	6.2	8.0	9.2	9.7	10.8	10.6	10.9	10.0	8.1	6.5	5.9	5.6	5.3	6.7

TABLE VIII.—*Resultant winds from observations at 8 a. m. and 8 p. m., daily, during the month of January, 1897.*

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
New England.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
Eastport, Me	26	13	10	27	n. 52 w.	22
Portland, Me	27	17	3	32	n. 71 w.	31
Northfield, Vt	26	28	3	13	s. 79 w.	10
Boston, Mass	16	17	7	35	s. 88 w.	28
Nantucket, Mass	29	12	8	27	n. 48 w.	26
Woods Hole, Mass.*	6	9	4	17	s. 77 w.	13
Block Island, R. I	23	11	12	34	n. 61 w.	25
New Haven, Conn	18	14	8	30	n. 80 w.	22
Middle Atlantic States.						
Albany, N. Y	22	18	6	25	n. 78 w.	19
Binghamton, N. Y†	7	9	6	16	s. 79 w.	10
New York, N. Y	23	11	12	32	n. 59 w.	23
Harrisburg, Pa	17	11	17	29	n. 63 w.	13
Philadelphia, Pa	33	8	15	28	n. 18 w.	26
Atlantic City, N. J	24	8	15	27	n. 37 w.	20
Baltimore, Md	16	9	16	31	n. 65 w.	17
Washington, D. C	31	11	13	18	n. 14 w.	21
Lynchburg, Va	19	16	17	28	n. 75 w.	11
Norfolk, Va	33	9	15	17	n. 5 w.	24
South Atlantic States.						
Charlotte, N. C	14	16	27	18	s. 77 e.	9
Hatteras, N. C	37	5	14	19	n. 9 w.	32
Kittyhawk, N. C	28	8	13	23	n. 27 w.	22
Raleigh, N. C	30	10	11	23	n. 31 w.	23
Wilmington, N. C	30	10	15	23	n. 22 w.	22
Charleston, S. C	29	9	17	21	n. 11 w.	20
Augusta, Ga	23	10	16	29	n. 45 w.	18
Savannah, Ga	30	9	12	27	n. 35 w.	26
Jacksonville, Fla	23	13	18	24	n. 31 w.	12
Florida Peninsula.						
Jupiter, Fla	24	11	17	26	n. 35 w.	16
Key West, Fla	29	6	36	3	n. 55 e.	40
Tampa, Fla	32	7	21	18	n. 7 e.	25
Eastern Gulf States.						
Atlanta, Ga	22	2	30	30	n. 27 w.	22
Pensacola, Fla	33	8	30	14	n. 13 e.	26
Mobile, Ala	31	17	12	16	n. 16 w.	15
Montgomery, Ala	24	9	18	30	n. 8 w.	15
Vicksburg, Miss	27	16	20	12	n. 36 e.	14
New Orleans, La	27	13	24	12	n. 41 e.	18
Western Gulf States.						
Shreveport, La	24	19	16	18	n. 22 w.	5
Fort Smith, Ark	14	7	25	22	n. 23 e.	8
Little Rock, Ark	22	19	12	23	n. 75 w.	11
Corpus Christi, Tex	33	13	17	12	n. 14 e	21
Galveston, Tex	27	15	20	16	n. 18 e.	13
Palestine, Tex	30	18	14	14	n.	12
San Antonio, Tex	36	15	16	7	n. 23 e.	23
Ohio Valley and Tennessee.						
Chattanooga, Tenn	23	18	11	26	n. 72 w.	16
Knoxville, Tenn	23	8	17	28	n. 36 w.	19
Memphis, Tenn	18	20	18	20	s. 45 w.	3
Nashville, Tenn	22	20	13	26	n. 81 w.	13
Lexington, Ky	20	22	9	31	s. 85 w.	22
Louisville, Ky	10	27	14	25	s. 33 w.	20
Indianapolis, Ind	12	17	12	30	s. 78 w.	17
Cincinnati, Ohio	11	23	16	25	s. 37 w.	15
Columbus, Ohio	13	17	15	32	s. 77 w.	18
Pittsburg, Pa	5	25	14	33	s. 44 w.	28
Parkersburg, W. Va	8	24	9	28	s. 50 w.	25
Lower Lake Region.						
Buffalo, N. Y	6	19	12	32	s. 57 w.	24
Oswego, N. Y	13	26	14	25	s. 40 w.	17
Rochester, N. Y	4	24	7	41	s. 60 w.	39
Erie, Pa	11	28	7	29	s. 52 w.	28
Cleveland, Ohio	7	30	14	28	s. 31 w.	27
Sandusky, Ohio	6	21	9	34	s. 59 w.	29
Toledo, Ohio	7	25	13	31	s. 45 w.	26
Detroit, Mich	10	27	13	27	s. 39 w.	22
Upper Lake Region.						
Alpena, Mich	15	21	6	35	s. 78 w.	30
Grand Haven, Mich	17	17	20	23	w.	3
Marquette, Mich	16	20	5	34	s. 82 w.	29
Port Huron, Mich	6	30	12	28	s. 34 w.	29
Sault Ste. Marie, Mich	17	19	21	15	s. 72 e.	6
Chicago, Ill	11	18	8	34	s. 75 w.	27

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
Upper Lake Region—Cont'd.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
Milwaukee, Wis	15	17	8	35	s. 86 w.	27
Greenbay, Wis	12	26	9	26	s. 27 w.	16
Duluth, Minn	19	15	2	39	n. 84 w	37
North Dakota.						
Moorhead, Minn	26	16	12	24	n. 50 w.	16
Bismarck, N. Dak	28	11	14	27	n. 38 w.	22
Williston, N. Dak	21	16	13	24	n. 66 w.	12
Upper Mississippi Valley.						
St. Paul, Minn	15	19	14	32	s. 77 w.	18
La Crosse, Wis. †	7	10	2	19	s. 80 w.	17
Davenport, Iowa	14	12	16	32	n. 83 w.	16
Des Moines, Iowa	27	14	9	28	n. 56 w.	23
Dubuque, Iowa	16	18	10	32	s. 85 w.	22
Keokuk, Iowa	18	17	12	30	n. 87 w.	18
Cairo, Ill	23	20	14	21	n. 67 w.	2
Springfield, Ill	17	20	9	31	s. 82 w.	28
Hannibal, Mo	23	16	9	29	n. 71 w.	21
St. Louis, Mo	13	19	15	27	s. 63 w.	13
Missouri Valley.						
Columbia, Mo.*	7	10	4	17	s. 77 w.	13
Kansas City, Mo	28	17	10	25	n. 54 w.	19
Springfield, Mo	25	20	12	21	n. 61 w.	10
Lincoln, Nebr	31	19	9	19	n. 40 w.	16
Omaha, Nebr	28	17	7	24	n. 57 w.	20
Sioux City, Iowa†	14	9	7	11	n. 39 w.	6
Pierre, S. Dak	25	10	19	23	n. 15 w.	16
Huron, S. Dak	30	14	14	25	n. 34 w.	19
Northern Slope.						
Havre, Mont	15	11	13	37	n. 81 w.	24
Miles City, Mont	18	26	12	20	s. 45 w.	11
Helena, Mont	13	19	2	43	s. 81 w.	41
Rapid City, S. Dak	16	22	8	34	s. 77 w.	27
Cheyenne, Wyo	30	8	5	32	n. 51 w.	35
Lander, Wyo	14	28	18	16	s. 8 e.	14
North Platte, Nebr	22	12	7	33	n. 69 w.	28
Middle Slope.						
Denver, Colo	19	26	16	11	s. 36 e.	9
Pueblo, Colo	18	14	19	21	n. 27 w.	4
Concordia, Kans	23	29	4	17	s. 65 w.	14
Dodge City, Kans	24	20	7	21	n. 74 w.	15
Wichita, Kans	29	24	7	11	n. 39 w.	6
Oklahoma, Okla	28	18	9	20	n. 48 w.	15
Southern Slope.						
Abilene, Tex	25	14	14	22	n. 36 w.	14
Amarillo, Tex	22	25	4	22	s. 81 w.	18
Southern Plateau.						
El Paso, Tex	20	6	16	34	n. 52 w.	23
Santa Fe, N. Mex	28	16	30	8	n. 61 e.	25
Phœnix, Ariz	10	17	26	19	s. 45 e.	10
Yuma, Ariz	36	9	18	8	n. 20 e.	29
Middle Plateau.						
Carson City, Nev	26	16	15	18	n. 17 w.	10
Winnemucca, Nev	18	17	21	18	n. 72 e.	3
Salt Lake City, Utah	11	19	14	31	s. 65 w.	19
Northern Plateau.						
Baker City, Oreg	14	35	21	12	s. 23 e.	23
Idaho Falls, Idaho	40	14	7	8	n. 2 w.	26
Spokane, Wash	25	12	18	16	n 9 e.	13
Walla Walla, Wash	8	32	9	27	s. 37 w.	30
North Pacific Coast Region.						
Fort Canby, Wash	7	23	38	4	s. 65 e.	38
Port Angeles, Wash.*	3	15	14	6	s. 34 e.	14
Seattle, Wash	18	24	25	6	s. 72 e.	20
Tatoosh Island, Wash	4	14	42	5	s. 75 e.	38
Portland, Oreg	24	14	23	17	n. 31 e.	12
Roseburg, Oreg	23	13	21	16	n. 27 e.	11
Middle Pacific Coast Region.						
Eureka, Cal	20	20	16	21	w.	5
Redbluff, Cal	24	19	18	22	n. 39 w.	6
Sacramento, Cal	24	24	20	14	e.	6
San Francisco, Cal	33	10	17	15	n. 5 e.	23
South Pacific Coast Region.						
Fresno, Cal	24	10	25	19	n. 23 e.	15
Los Angeles, Cal	21	11	25	20	n. 27 e.	11
San Diego, Cal	19	17	17	24	n. 74 w.	7
San Luis Obispo, Cal	26	20	3	19	n. 69 w.	17

*From observations at 8 p. m. only. †From observations at 8 a. m. only.

TABLE IX.—*Thunderstorms and auroras, January, 1897.*

States.	No. of stations.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total. No.	Total. Days.	
Alabama	53	T.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Arizona	48	T.	1	....	1	....	....	....	....	....	....	....	2	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	4	1	....	11	7	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Arkansas	51	T.	8	14	....	....	....	....	....	....	....	....	....	....	1	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	25	4	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
California	197	T.	....	....	....	....	....	....	....	....	2	....	2	....	1	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	13	....	....	20	5	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Colorado	70	T.	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Connecticut	22	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	2	2	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Delaware	6	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Dist. of Columbia	4	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Florida	38	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	....	....	....	....	3	1	....	....	....	1	7	5	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Georgia	49	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Idaho	36	T.	1	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	3	T.
		A.	....	1	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	A.
Illinois	97	T.	4	11	2	....	....	....	....	....	....	....	....	....	1	....	....	1	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	22	5	T.
		A.	....	....	....	1	....	....	....	....	....	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	3	A.
Indiana	48	T.	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....	8	2	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Indian Territory	6	T.	1	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	2	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Iowa	101	T.	....	....	....	....	....	.	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	T.
		A.	1	1	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	2	A.
Kansas	73	T.	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Kentucky	47	T.	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	2	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Louisiana	48	T.	4	4	9	....	....	....	....	....	....	....	....	....	....	1	....	1	....	....	5	1	....	....	....	....	....	1	....	....	....	....	1	27	9	T.
		A.	....	....	....	..	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Maine	16	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	2	5	..	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	9	3	A.
Maryland	31	T.	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1	1	A.
Massachusetts	77	T.	....	7	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	7	1	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	8	2	A.
Michigan	96	T.	....	1	....	....	....	....	....	....	....	....	....	..	....	....	....	....	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	11	2	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Minnesota	69	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	2	3	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	6	3	A.
Mississippi	52	T.	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	5	2	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Missouri	96	T.	12	25	2	....	....	....	1	....	....	....	....	....	....	....	....	1	....	....	1	....	....	....	....	....	....	2	....	....	....	....	....	42	6	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	2	A.
Montana	40	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	3	4	1	....	....	....	....	....	....	....	1	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	12	7	A.
Nebraska	112	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	2	1	T.
		A.	....	2	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	3	2	A.
Nevada	39	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	2	1	T.
		A.	..	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
New Hampshire	23	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	1	5	1	....	....	....	....	....	....	....	....	..	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	8	4	A.
New Jersey	54	T.	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	1	A.
New Mexico	36	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
New York	93	T.	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	4	2	T.
		A.	....	6	....	....	....	1	....	....	....	....	1	..	....	....	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	1	1	12	7	A.
North Carolina	60	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	2	1	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
North Dakota	39	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	3	9	....	....	2	....	1	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	17	6	A.
Ohio	140	T.	2	1	2	1	....	....	....	....	....	....	....	....	....	....	....	....	41	2	....	1	....	....	....	....	....	....	....	....	....	....	....	50	7	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	A.
Oklahoma	20	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	2	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Oregon	60	T.	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Pennsylvania	93	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	1	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Rhode Island	6	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
South Carolina	42	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
South Dakota	46	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	2	3	....	....	....	....	....	....	....	....	1	..	....	....	....	....	....	....	....	....	....	1	....	....	1	....	1	2	....	....	....	11	7	A.
Tennessee	49	T.	....	....	1	1	....	....	....	....	....	....	....	....	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	7	3	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1	1	A.
Texas	91	T.	7	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....	....	2	1	17	6	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Utah	32	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Vermont	13	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	1	6	1	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	8	3	A.
Virginia	37	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Washington	51	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
West Virginia	37	T.	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Wisconsin	58	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Wyoming	11	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	2	1	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Sums	2,713	T.	40	64	19	5	1	0	1	0	2	0	5	0	9	3	1	7	73	4	7	4	1	0	0	0	0	4	1	1	19	3	3	277	....	T.
		A.	15	52	4	1	2	1	0	1	0	1	3	0	3	0	0	2	1	0	1	1	1	1	2	0	1	3	2	5	1	2	5	111	....	A.

TABLE X.—*Hourly sunshine as deduced from sunshine recorders, January, 1897.*

Stations.	Instrument.	Percentages for each hour of local mean time ending with the respective hour.																Monthly summary.			
		A. M.								P. M.								Instrumental record.			
		5	6	7	8	9	10	11	Noon	1	2	3	4	5	6	7	8	Actual.	Possible.	Per cent of possible.	Personal estimate.
																		Hours.	*Hours.*		
Albany, N. Y*	T.	.....	.....	.....	28	28	37	41	43	47	45	41	30	20	.....	.....	.....	78.5	214.5	37	27
Atlanta, Ga	T.	.....	.....	0	16	29	50	51	59	59	60	52	46	26	22	.....	.....	140.1	316.2	44	43
Atlantic City, N. J	P.	.....	.....	.....	40	46	53	60	61	58	61	55	49	52	57	.....	.....	163.6	303.8	54	48
Baltimore, Md	T.	.....	.....	.....	37	30	36	38	35	42	49	40	33	36	60	.....	.....	115.1	303.8	38	45
Binghamton, N. Y	T.	.....	.....	.....	6	14	25	35	38	43	29	23	20	16	31	.....	.....	76.2	295.5	26	25
Bismarck, N. Dak	P.	.....	.....	.....	31	30	37	43	39	40	49	49	49	48	0	.....	.....	118.0	279.9	42	35
Boston, Mass	T.	.....	.....	.....	37	45	45	39	47	51	53	48	49	42	62	.....	.....	136.4	295.5	46	39
Buffalo, N. Y	T.	.....	.....	.....	0	2	16	32	34	35	32	32	24	14	22	.....	.....	68.1	292.7	23	21
Charleston, S. C	T.	.....	.....	50	39	39	47	48	60	66	58	64	68	56	53	.....	.....	173.5	318.5	54	51
Chattanooga, Tenn	T.	.....	.....	0	23	31	41	59	52	52	53	49	37	24	14	.....	.....	130.8	314.6	42	41
Cheyenne, Wyo	P.	.....	.....	.....	64	66	77	71	74	68	63	56	50	33	35	.....	.....	185.5	298.4	62	46
Chicago, Ill	T.	.....	.....	.....	25	25	34	38	43	48	48	40	36	37	85	.....	.....	118.1	295.5	38	37
Cincinnati, Ohio	T.	.....	.....	.....	34	32	38	32	41	44	38	34	40	47	77	.....	.....	114.0	303.8	38	37
Cleveland, Ohio	T.	.....	.....	.....	11	10	15	22	30	34	24	22	10	10	31	.....	.....	57.1	295.5	19	18
Columbus, Ohio†	T.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denver, Colo	P.	.....	.....	.....	63	62	75	79	69	74	72	73	56	30	17	.....	.....	196.0	301.1	65	54
Des Moines, Iowa	T.	.....	.....	.....	34	41	48	55	61	63	63	64	53	46	46	.....	.....	158.1	295.5	54	53
Detroit, Mich	T.	.....	.....	.....	19	22	29	42	42	48	43	41	27	21	38	.....	.....	101.1	295.5	34	27
Dodge City, Kans	P.	.....	.....	.....	51	58	65	69	75	74	74	72	70	64	54	.....	.....	206.9	306.5	68	61
Dubuque, Iowa	T.	.....	.....	.....	17	18	28	38	42	43	43	41	37	36	54	.....	.....	104.3	295.5	35	39
Eastport, Me	P.	.....	.....	.....	37	48	60	62	56	48	48	49	45	36	67	.....	.....	142.1	286.7	50	35
Eureka, Cal	P.	.....	.....	.....	16	25	32	33	35	39	41	44	35	23	12	.....	.....	98.1	298.4	33	44
Fresno, Cal	T.	.....	.....	.....	3	11	22	26	23	25	20	17	20	18	6	.....	.....	57.5	309.0	19	22
Galveston, Tex	P.	.....	.....	12	19	30	39	47	46	46	49	44	36	22	12	.....	.....	119.1	326.8	36	39
Helena, Mont	P.	.....	.....	.....	26	26	46	57	45	43	42	44	34	30	0	.....	.....	113.6	279.9	41	41
Indianapolis, Ind	T.	.....	.....	.....	36	34	46	62	69	73	74	70	50	39	71	.....	.....	168.7	301.1	56	37
Kansas City, Mo	P.	.....	.....	.....	59	56	51	52	51	45	55	56	54	49	43	.....	.....	159.7	303.8	53	49
Little Rock, Ark	T.	.....	.....	.....	40	45	50	60	61	59	60	52	54	49	47	.....	.....	166.6	314.6	53	41
Los Angeles, Cal	P.	.....	.....	40	62	67	76	73	74	71	70	73	57	45	37	.....	.....	208.7	316.2	66	58
Louisville, Ky	T.	.....	.....	.....	44	39	37	47	50	56	54	43	37	42	62	.....	.....	138.0	306.5	45	37
Minneapolis, Minn	T.	.....	.....	.....	24	20	36	46	51	55	46	38	33	32	33	.....	.....	112.4	286.7	39	.....
Nashville, Tenn	T.	.....	.....	.....	43	55	52	57	61	65	65	56	55	46	47	.....	.....	172.8	311.8	55	49
New Orleans, La	T.	.....	.....	12	13	15	25	26	37	45	43	44	39	36	31	.....	.....	104.1	324.9	32	30
New York, N. Y	T.	.....	.....	.....	34	48	54	61	61	64	63	57	49	45	65	.....	.....	162.3	298.4	54	45
Northfield, Vt	P.	.....	.....	.....	35	36	44	44	39	41	44	47	27	22	67	.....	.....	111.6	289.7	39	33
Omaha, Nebr	P.	.....	.....	.....	46	49	58	58	53	55	55	55	50	45	29	.....	.....	153.7	298.4	52	48
Philadelphia, Pa	T.	.....	.....	.....	47	45	57	62	61	56	57	50	47	49	75	.....	.....	161.3	301.1	54	44
Phœnix, Ariz	P.	.....	.....	50	58	62	65	69	66	75	74	68	66	45	44	.....	.....	201.9	318.5	63	57
Pittsburg, Pa	T.	.....	.....	.....	0	3	10	20	26	31	35	30	22	17	29	.....	.....	60.5	298.4	20	26
Portland, Me	T.	.....	.....	.....	6	26	54	66	71	72	73	66	53	33	67	.....	.....	161.7	289.7	56	49
Portland, Oreg	T.	.....	.....	.....	6	6	18	26	30	35	34	31	22	14	0	.....	.....	66.6	283.1	24	29
Do	P.	.....	.....	.....	6	6	17	23	26	31	34	28	25	14	0	.....	.....	62.8	283.1	22	29
Raleigh, N. C	T.	.....	.....	.....	22	41	53	61	70	69	67	62	56	42	46	.....	.....	170.0	311.8	55	47
Rochester, N. Y	T.	.....	.....	.....	7	10	18	36	45	45	43	36	29	20	33	.....	.....	88.8	292.7	30	24
St. Louis, Mo	T.	.....	.....	.....	42	47	59	65	65	63	57	59	49	49	70	.....	.....	170.0	303.8	56	43
St. Paul, Minn	P.	.....	.....	.....	26	31	44	43	39	41	42	41	35	30	33	.....	.....	108.4	286.7	38	38
Salt Lake City, Utah	P.	.....	.....	.....	34	47	49	52	45	41	54	48	45	25	6	.....	.....	132.2	298.4	44	25
San Diego, Cal	P.	.....	.....	50	58	58	65	69	71	74	74	74	66	65	55	.....	.....	213.6	318.5	67	58
San Francisco, Cal	T.	.....	.....	.....	12	44	55	66	68	70	67	61	49	28	13	.....	.....	161.4	306.5	53	40
Santa Fe, N. Mex	P.	.....	.....	.....	57	62	71	69	74	71	70	75	64	45	36	.....	.....	203.5	311.8	65	56
Savannah, Ga	P.	.....	.....	50	32	46	55	48	42	46	42	47	46	31	26	.....	.....	137.9	320.5	43	48
Seattle, Wash	T.	.....	.....	.....	16	13	8	17	26	30	30	20	18	13	0	.....	.....	54.5	276.2	20	25
Spokane, Wash	P.	.....	.....	.....	4	7	11	9	6	0	11	16	17	9	0	.....	.....	25.9	276.2	9	30
Tampa, Fla	T.	.....	.....	33	35	40	56	60	60	68	71	65	48	38	45	.....	.....	181.6	328.7	55	52
Vicksburg, Miss	T.	.....	.....	50	44	44	51	59	67	63	63	59	59	53	56	.....	.....	180.0	320.5	56	55
Washington, D. C	P.	.....	.....	.....	49	52	56	55	61	54	53	57	51	49	63	.....	.....	163.6	303.8	54	50
Wilmington, N. C	T.	.....	.....	20	30	46	57	65	74	75	73	69	61	49	43	.....	.....	188.4	316.2	60	56

*All values for 25 days; the total possible and personal estimate for 31 days are 292.7 and 30, respectively. †Instrument out of order.

TABLE XI.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour during January, 1897, at all stations furnished with self-registering gauges.*

Station.		Total duration.	Total precipitation.	Amount before excessive rate began.	Accumulated amounts (in inches) during periods of time as indicated.															
					5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.	140 min.	160 min.	180 min.
		h. m.	*Inches.*	*Inches.*																
Atlanta, Ga	20		1.11												0.40						
Baltimore, Md.*																					
Bismarck, N. Dak.†																					
Boston, Mass	5		0.33												0.28						
Buffalo, N. Y	5-6		1.18												0.25						
Chicago, Ill.*																					
Cincinnati, Ohio	17		0.61																		
Cleveland, Ohio	20-21		0.26												0.21						
Denver, Colo	1		0.50												0.10						
Detroit, Mich	17		0.11							0.11					0.16						
Dodge City, Kans.†																					
Duluth, Minn.†																					
Eastport, Me	18		1.03																		
Galveston, Tex	19	6 20	0.96	0.20	0.20	0.35	0.42	0.46	0.50	0.54	0.60	0.65	0.70		0.15						
Indianapolis, Ind	16-17		0.67												0.27						
Jacksonville, Fla	26-27		1.06												0.25						
Jupiter, Fla §	25-26	21 30	1.29	0.50	0.05	0.11	0.21	0.53	0.58	0.60											
Jupiter, Fla ‡	29-30	34 0	3.91	3.15	0.05	0.08	0.10	0.11	0.13	0.15	0.18	0.30	0.40	0.55	0.70						
Kansas City, Mo.†																					
Key West, Fla	25-26		1.09												0.32						
Little Rock, Ark	2-3	10 0	4.99	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	3.34
Louisville, Ky.*																					
Memphis, Tenn	16-17		1.64												0.45						
Milwaukee, Wis.*																					
Nantucket, Mass.†																					
Nashville, Tenn	12-13		1.33												0.31						
New Orleans, La.*																					
New York, N. Y.*																					
Norfolk, Va	13-14		0.51												0.12						
Omaha, Nebr	12		0.32												0.12						
Philadelphia, Pa	20-21		0.86												0.30						
Pittsburg, Pa.*																					
Portland, Me	20-21		1.54												0.41						
Portland, Oreg.*																					
Rochester, N. Y	4-5		0.50												0.17						
St Louis, Mo	2		0.64												0.23						
St. Paul, Minn	16-17		0.67												0.17						
Salt Lake City, Utah	16		0.32												0.05						
San Diego, Cal	14		1.62												0.40						
San Francisco, Cal	30-31		1.08												0.17						
Savannah, Ga	14-15		0.95												0.45						
Seattle, Wash	24-25		0.95												0.13						
Vicksburg, Miss	17	3 50	1.20	0.17	0.02	0.06	0.20	0.30	0.44	0.55	0.66	0.75	0.86	0.94	1.00						
Washington, D. C	20-21		1.04												0.27						
Wilmington, N. C	20		0.87								0.36										

*Self register out of order. †No record, on account of snow.

TABLE XII.—*Excessive precipitation, by stations, for January, 1897.*

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Alabama.	*Inches.*	*Inches.*		*Ins.*	*h.m.*	
Valleyhead		2.64	13			
Arizona.						
Congress		2.88	14			
Pinal Ranch		2.63	11			
Arkansas.						
Beebranch		3.00	3			
Blackton	11.12	4.70	3			
Do		2.75	16			
Blanchard Springs		3.60	2-3			
Brinkley		3.82	2-3			
Do		2.75	16-17			
Camden		2.69	15-16			
Conway		3.17	2-3			
Elon		2.98	3			
Fayetteville		3.70	2			
Forrest		3.85	2-3			
Fort Smith		3.64	1-2			
Fulton		2.72	3			
Hot Springs *b*		2.75	3			
Keesees Ferry		4.78	2-3			
Lacrosse		4.60	2-3			
Little Rock		4.74	2-3	3.34	3 00	2
Lonoke		4.25	3			
Malvern		2.68	3			
Marvell		2.65	3			
Moore	14.72	7.00	2-3			
Do		3.00	16			
Mossville		4.93	2-3			
New Gascony		3.64	3			
Newport		4.94	2-3			
Osceola		2.77	16-17			
Pine Bluff	13.83	5.58	3			
Pocahontas		2.82	2			
Silver Springs		4.55	2			
Stuttgart		4.21	2-3			
Washington		3.72	2-3			
Wiggs		3.86	2-3			
California.						
Fort Ross		2.58	29			
Malakoff Mine		2.72	28-29			
Mount Frazier		4.61	13-14			
Mutah Flat		3.25	30-31			
Pilot Creek		3.22	29			
Shasta		4.90	28-29			
Sneddens Ranch		2.50	10			
Susanville		5.04	31			
Upper Mattole		3.28	28-29			
Connecticut.						
New London		2.63	27-28			
N. Grosvenor Dale		2.80	28			
Windsor		2.60	27-28			
Florida.						
Jupiter		3.59	30			
Lemon City		4.30	31			
Illinois.						
Alexander		3.11	2			
Atlanta		2.56	2			
Beardstown		4.20	2-3			
Bushnell		3.95	1-2			
Coatsburg		2.94	2			
Griggsville		5.16	2-3			
Havana		2.98	2			
Knoxville		3.20	2-3			
Laharpe	10.38	5.97	2-3			
Peoria		2.90	2-3			
Tiskilwa		2.74	1-2			
Indian Territory.						
Lehigh		5.26	1-2			
South McAlester		2.50	1-2			
Tahlequah		6.20	1-2			
Iowa.						
Bonaparte		2.92	2-3			
Louisiana.						
Bastrop		3.16	3			
Cameron	10.73	7.65	1			
Farmerville		3.31	1-2			
Lake Charles	10.95	4.00	1			
Oakridge		2.60	16-17			
Oberlin	12.20	7.00	1-2			
Do		2.50	31			
Oxford		3.15	1-2			
Plain Dealing		2.82	2			
Port Eads		2.63	1			
Sugartown		2.85	1			
Massachusetts.						
Lake Cochituate		2.56	27-28			

TABLE XII.—*Excessive precipitation.*—Continued.

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Michigan.	*Inches.*	*Inches.*		*Ins.*	*h.m.*	
Alma		2.97	2-3			
Gaylord		2.50	2-3			
Gladwin		3.20	2			
Hart		2.56	3			
Muskegon		4.90	1-3			
Rockland		2.60	4			
Mississippi.						
Austin		2.97	3			
Kosciusko		3.00	3			
Rosedale		2.59	2			
Vicksburg				1.00	1 00	17
Missouri.						
Appleton City		3.52	1-2			
Arthur		2.70	1-2			
Birchtree		4.00	2-3			
Booneville		3.86	1-2			
Brunswick		2.68	1-2			
Cedargap		6.95	1-2			
Columbia		5.02	1-2			
Darksville		3.50	2			
Edgehill		3.21	2-3			
Emma		2.75	2-3			
Fayette		4.33	1-2			
Fulton		6.70	1-3			
Gorin		2.87	2			
Grovedale	10.37	8.71	2-3			
Halfway		3.61	2			
Hannibal		3.11	2-3			
Hastain		4.70	1-2			
Hermann		3.78	2-3			
Houston		4.72	2-3			
Houstonia (near)		3.19	1-2			
Humansville		3.50	1-2			
Ironton		5.50	1-3			
Jefferson City		4.00	3			
Lamar		4.23	2			
Lamonte		3.10	1-2			
Lebanon		6.60	1-2			
Macomb		6.50	2-3			
Mansfield		5.50	1-2			
Marshall		2.72	2			
Mexico		3.46	3			
Mine La Motte		2.85	2-3			
Mineral Springs		4.00	1-2			
Montreal		4.00	1-2			
Mount Vernon		4.03	2			
Neosho		3.40	1-2			
Nevada		3.00	1-2			
New Haven		6.60	1-3			
New Palestine		4.06	1-2			
Oakmound		3.55	3			
Olden		4.86	1-2			
Osceola		5.20	2			
Oto		5.00	1-2			
Palmyra		3.70	2			
Phillipsburg		4.73	1-2			
Poplar Bluff		2.80	3			
Potosi		2.60	2-3			
Rhineland		4.07	1-2			
Rolla		6.65	1-3			
Sarcoxie		3.42	1-2			
Shelbina		5.70	2-3			
Springfield		4.64	1-2			
Steffenville		3.50	2			
Stellada		2.92	1-2			
Sublett		3.00	16			
Virgil City		4.15	1-2			
Warrenton		7.18	1-2			
Wheatland		2.59	2			
Willow Springs		4.00	3			
Oregon.						
Glenora	12.89					
Nehalem	10.43					
Texas.						
Arthur City		2.73	1			
Orange		3.00	1			
Virginia.						
Guinea		3.00	21			
Manassas		3.52	27			
Washington.						
Clearwater	16.56	7.46	3-4			
Lapush	11.40					
North Bend	10.07					
Tatoosh Island	12.20	3.12	5-6			

Chart I. Tracks of Centers of High Areas, January, 1897

Chart I. Tracks of Centers of High Areas. January, 1897.

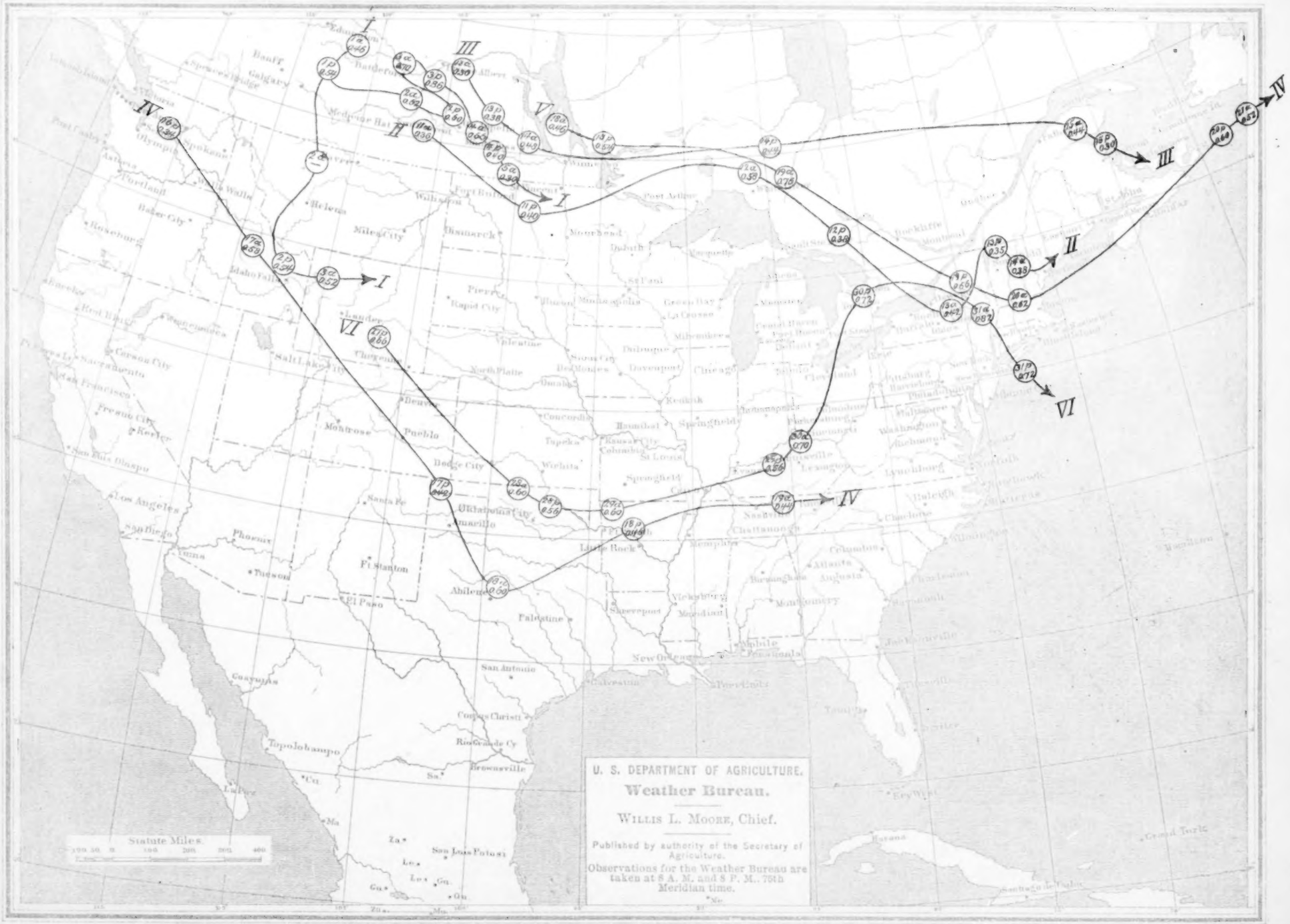

Chart II. Tracks of Centers of Low Areas. January, 1897.

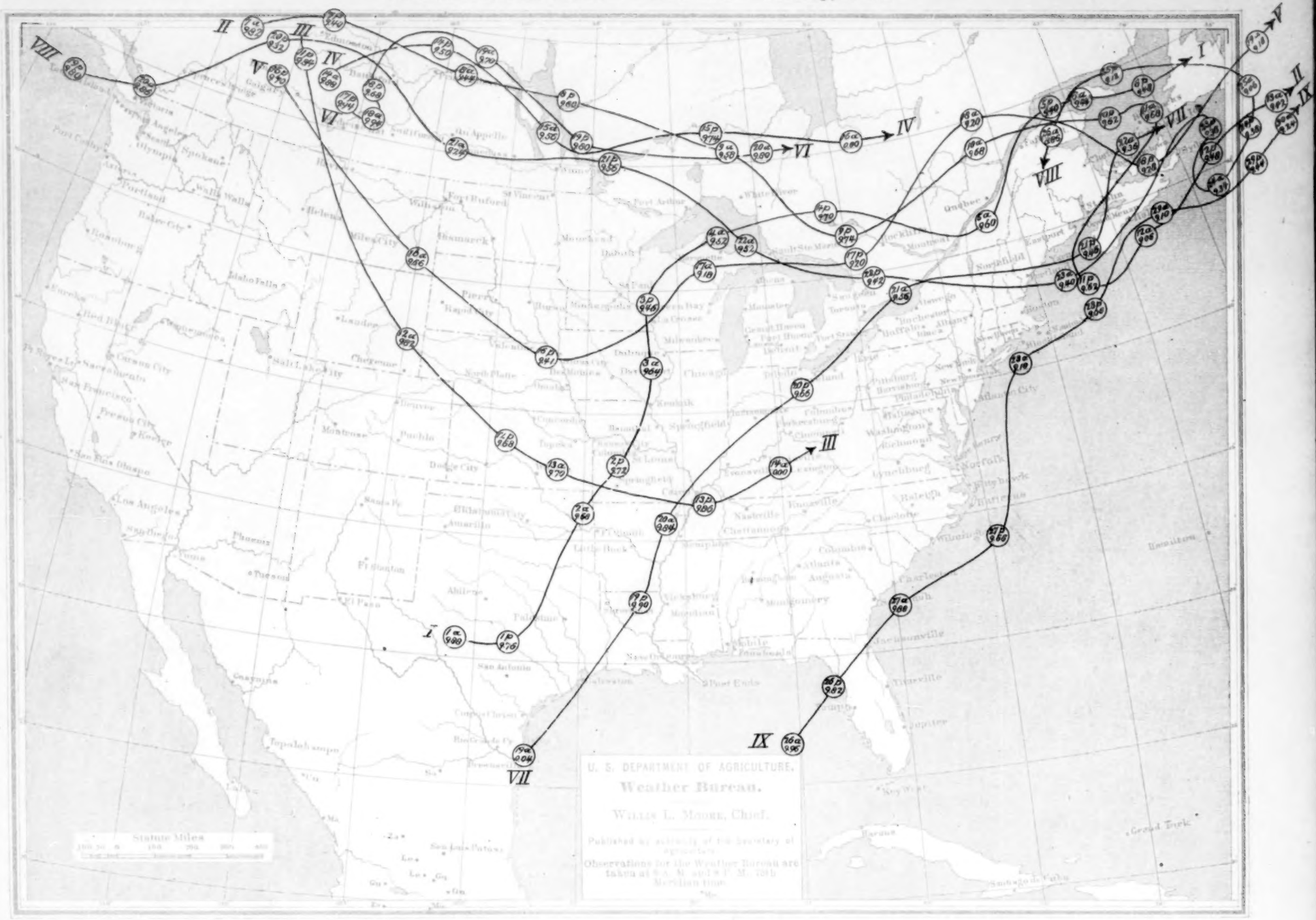

Chart III. Total Precipitation. January, 1897.

Chart III. Total Precipitation. January, 1897.

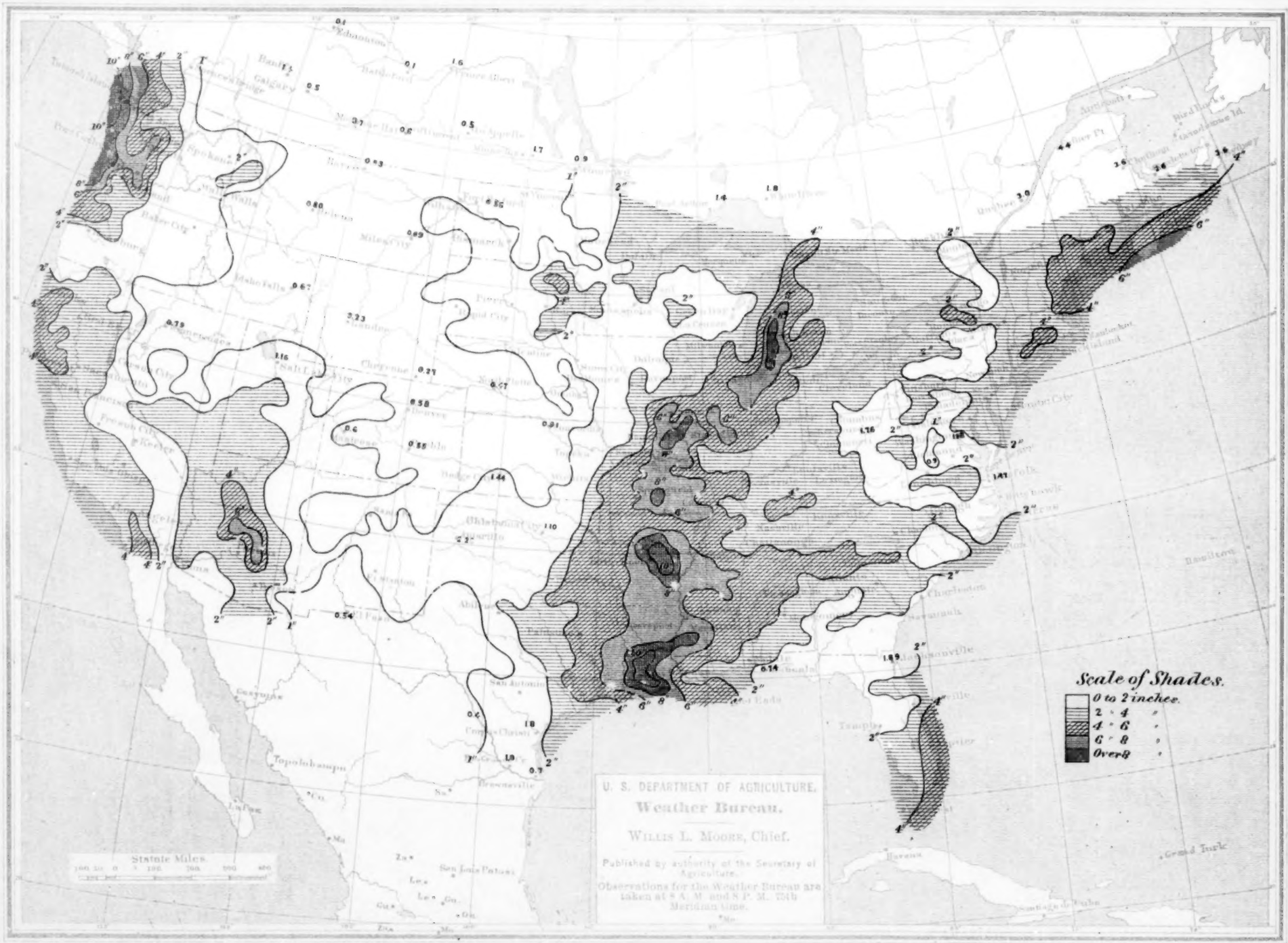
Scale of Shades.
0 to 2 inches.
2 " 4 "
4 " 6 "
6 " 8 "
Over 8 "
U. S. DEPARTMENT OF AGRICULTURE.
Weather Bureau.
WILLIS L. MOORE, Chief.
Published by authority of the Secretary of Agriculture.
Observations for the Weather Bureau are taken at 8 A. M. and 8 P. M. 75th Meridian time.
Statute Miles

Chart IV. Isobars, Isotherms, and Resultant Winds. January, 1897.

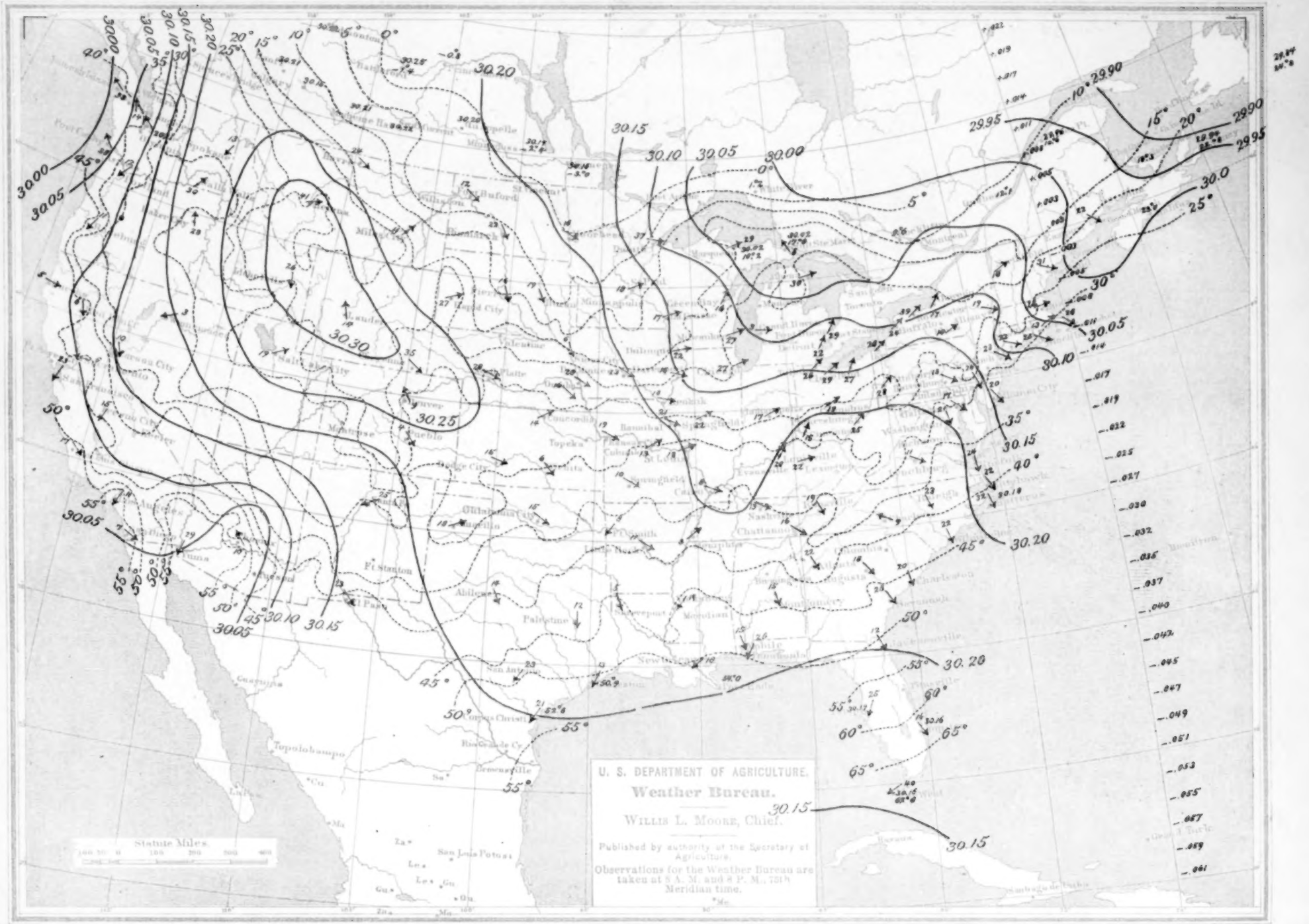
U. S. DEPARTMENT OF AGRICULTURE.
Weather Bureau.
Willis L. Moore, Chief.
Published by authority of the Secretary of Agriculture.
Observations for the Weather Bureau are taken at 8 A. M. and 8 P. M., 75th Meridian time.
Statute Miles.

Chart V. Depth of Snowfall and Limits of Freezing Weather. January, 1897.

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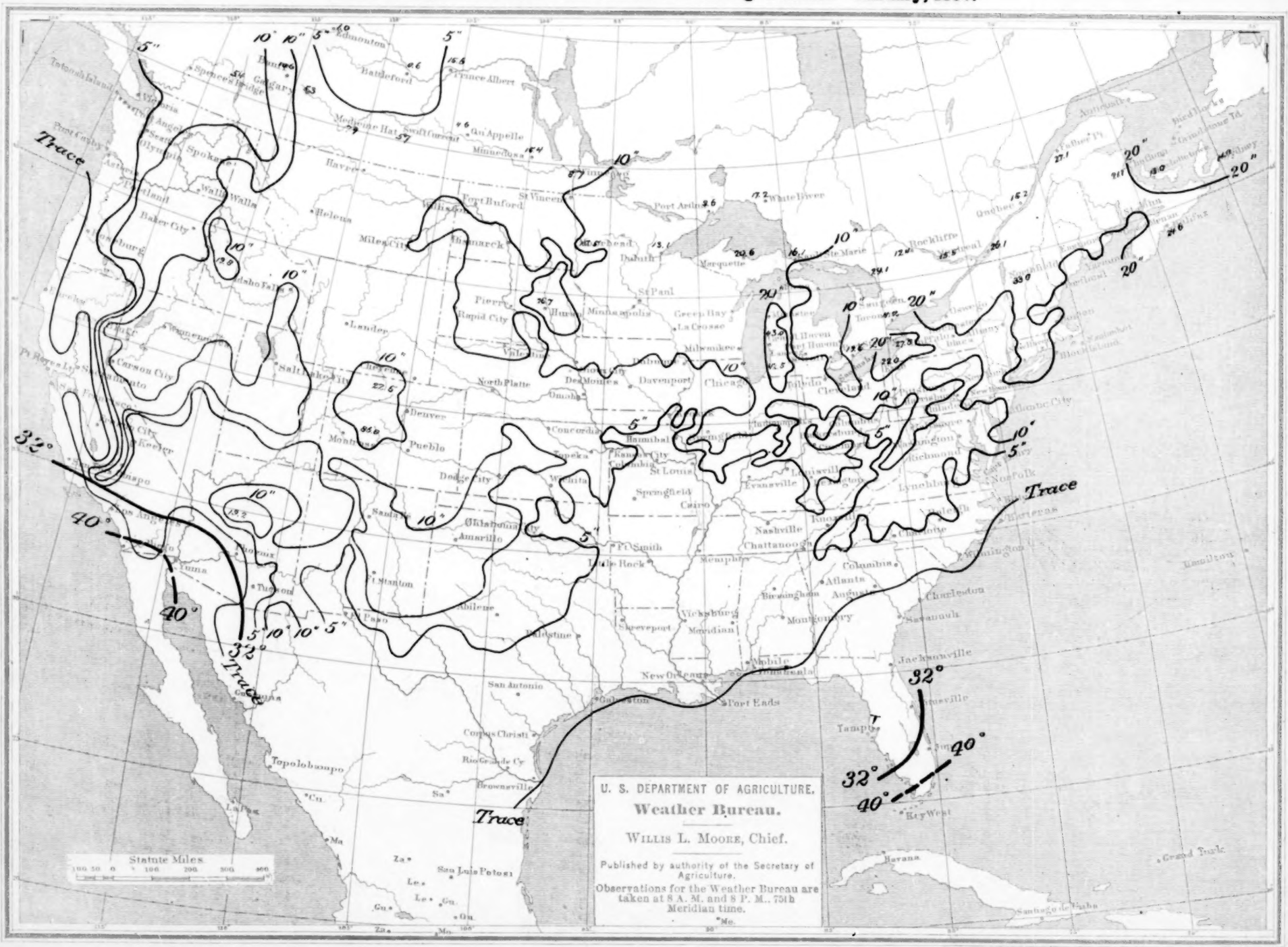
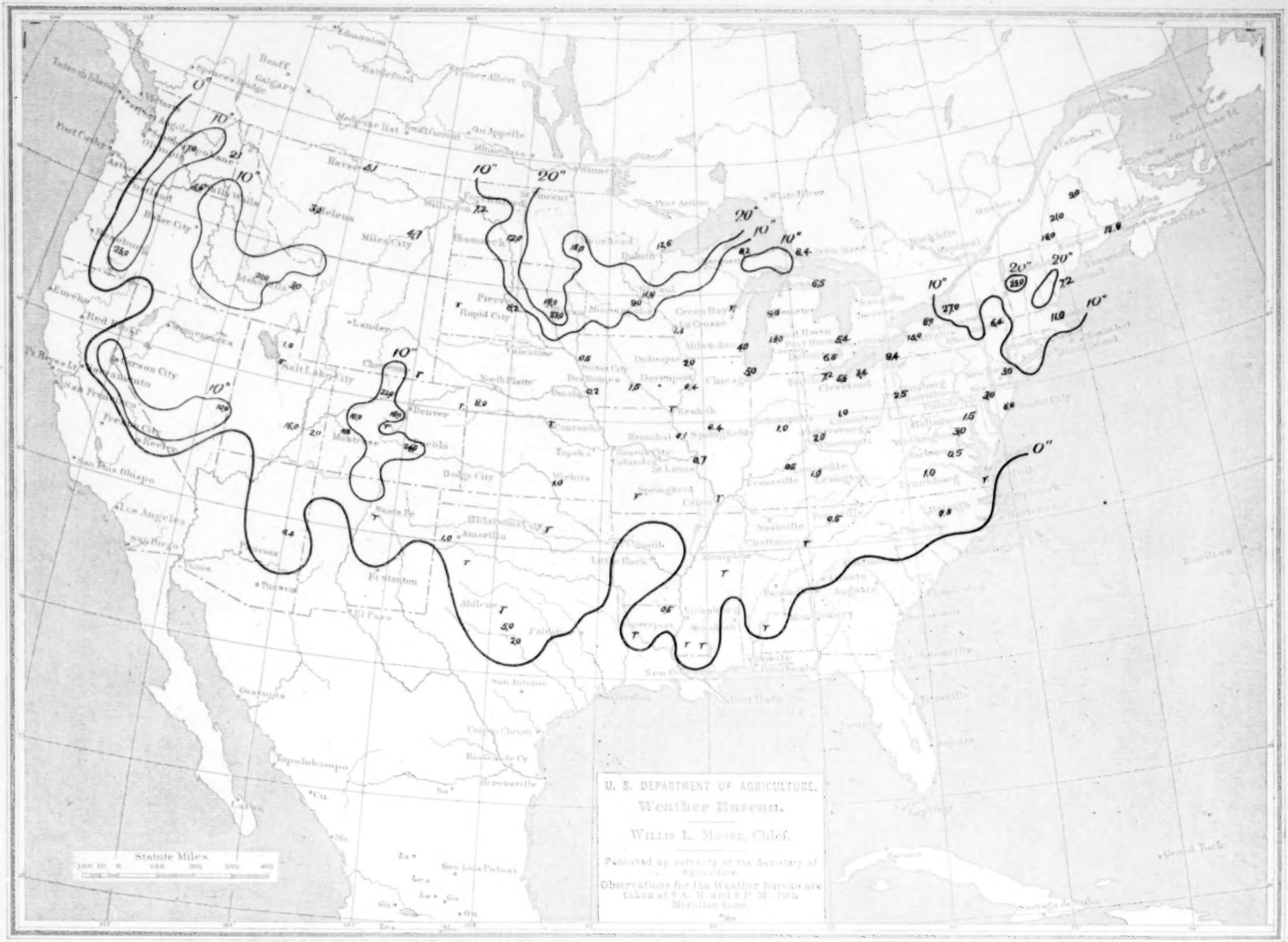


Chart VI. Depth of Snow on Ground at the Close of the Month. January, 1897.


0"
10"
20"
Statute Miles
U. S. DEPARTMENT OF AGRICULTURE.
Weather Bureau.
WILLIS L. MOORE, Chief.
Published by authority of the Secretary of Agriculture.
Observations for the Weather Bureau are taken at 8 A. M. and 8 P. M., 75th Meridian time.

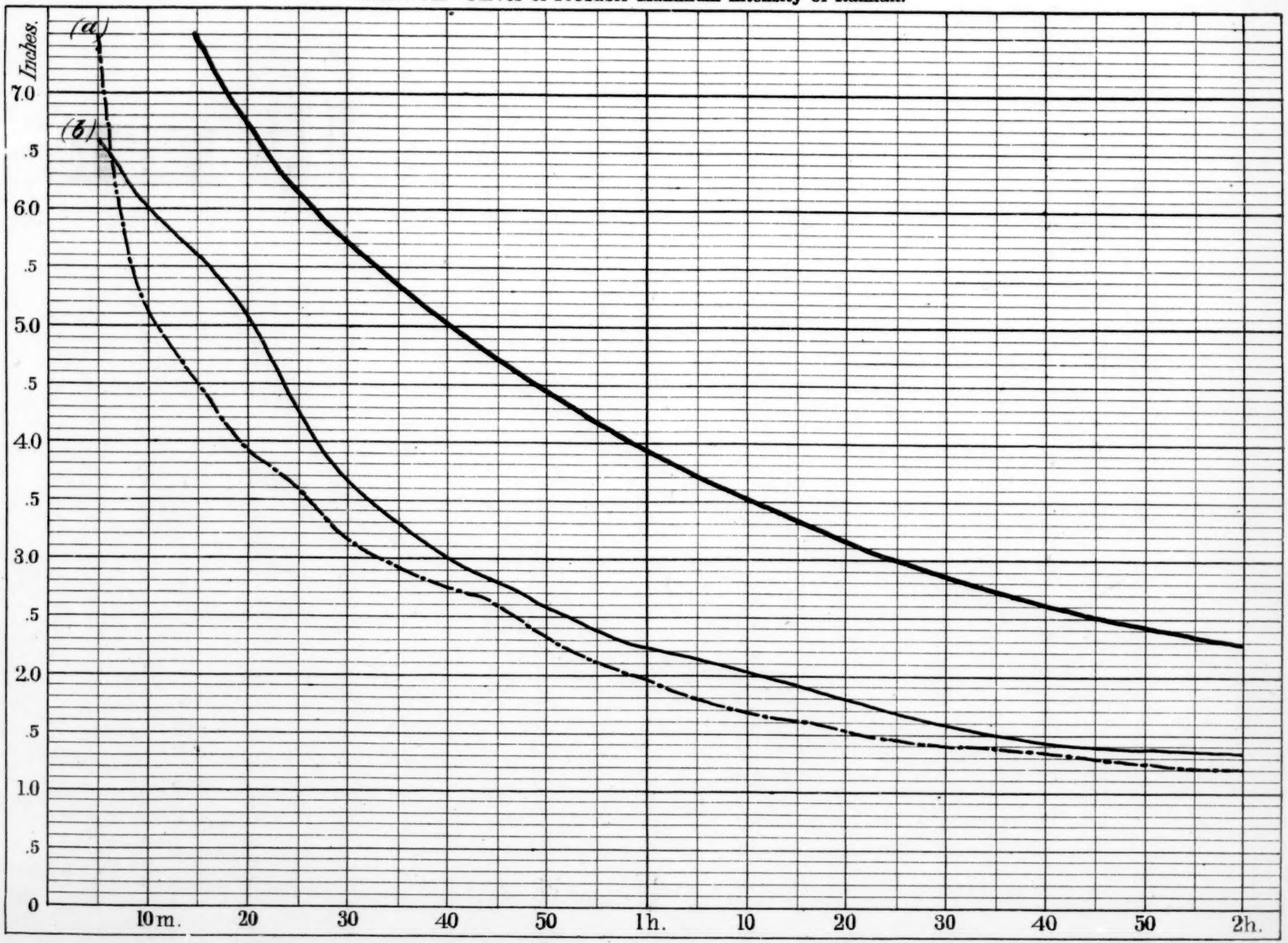



Chart VII. Curves of Probable Maximum Intensity of Rainfall.